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PART I.

A REVIEW OF THE MEDICAL LITERATURE OF 1906.

EDITORIAL.

ANNOUNCEMENT.

A résumé of medical progress has a two-fold purpose. It brings home to the physician in general practice, burdened with duties and obligations destructive of much leisure for reading, the multum in parvo for the current year; it also has a compactness that makes it a good reference book in case the afore-mentioned busy physician wishes at any time to refer to a subject, the memory of which may have escaped him.

The popularity of the Annual Progress Number has been so gratifying that the editors feel a departure from the usual custom of publishing the Annual Progress Number in one issue will not be judged amiss by the public. This year the intention of the editors is to have not only a January, but also a February number. In this way the fourteen reviews will be equally divided.

The advantages derived from this innovation will, we feel sure, be appreciated by all our readers. Published in two issues, the Progress Number, while having the same interest as heretofore and permitting each subject to occupy more space, will be materially lessened in bulk and weight.

THE TREND OF MEDICAL JOURNALISM.

That the tendency in medical journalism is an upward and not a downward one, means much to those who are attempting, through rather muddy waters, to guide the good ship to a safe port. There was a time, not many years ago, when a medical journal consisted of an ill-assorted mass of articles manufactured purposely not to offend the susceptibilities of its gentle readers; and this was sandwiched between a conglomer-

eration of advertisements, upon the face of which was written, in large, fat letters, the commercial intensity, the scientific apathy of the editor and manager.

Those were the days when a non-discriminating public was willing to sacrifice its best attributes of common sense and fair play, in its zeal to lend patronage to any journal that would publish an article by a physician who had friends in the profession, be he devoid of ideas and have a literary sense on a par with that of the ordinary child.

Fortunately for us, those dark days are almost over and few, if any, of our journals of recognized worth are guilty, at intervals, of a like misdemeanor. And misdemeanor it was, for its continuance by the editors and toleration by the public meant just so much prostitution of a branch of literature as important as *belles-lettres*, the scientific or the historical.

Even though we of today suffer on account of the literary ignorance and insatiable commercialism of the editors of yesterday, we should take hope, since the prejudices against us are fast crumbling away, and support is not wanting from a public, the better elements of which, as a result of education, are fortunately dominating those who still are in the fourth estate as regards enlightenment.

A pertinent question which has often occurred to us is this: Why should not a medical journal reach the high literary level of the purely literary weekly and monthly? If it is our desire to conserve the virility and intrinsic beauties of our mother tongue, the matter of the constructive principles of a language should be paramount. Furthermore, ease and felicity of expression combined with refinement would do much to place our representative medical journals in the same rank with other thought-compelling publications. When this is done, we feel all caviling will be silenced, and the best medical thought will not be confined, as it is generally now, to the journal in which it originally appears, but find a larger audience, in its reprinted form, in the weightier literary weeklies and monthlies.

Ideas, though strictly medical, are not necessarily independent of the currents of thought permeating the world today. Rather do they bear a decided relation to other thoughts, an interdependence, so to speak, which invests them with supreme importance. Granting this, it can readily be seen that the adoption of a medical idea by a literary journal is furthered by a proper presentation of the idea. Too often we have come across good ideas hidden away in articles, which, under the guiding hand of a kindly literary monitor, could have been made lucid enough to be of practical benefit to mankind. Therefore, it is not a superfluity to assert that recognition of the moment of a medical idea by the world of thinkers and philosophers, and the world in general, cannot take place until the idea is presented, not in a palatable, popular manner, but with a dig-

nity derived from a verbal expression, whose every tone and shading shall have an appeal to the student of the deeper things of life.

As soon as medical journalism achieves this ideal, a happier state will be inaugurated. The dissemination of ideas will not then depend, almost entirely, on a daily press, which, to please its superficial readers, must perforce popularize an article, but be countenanced by a proper appreciation from the intellectual of a community, an appreciation ever ready to make obeisance to ideas, when the science thereof attracts on account of a setting informed with clarity, simplicity and directness.

To help the recognition of the equal rights of medical journalism with journals representing literature in its highest walks, the editorial department should play no minor part. Its special page, while purely impersonal, should reflect the trend of thought, not only of the journal in which it appears but of the best in the medical world. Its dignity should convey a lesson to the writers of screeds and lampoons; ought to show them, in fact, that medical journalism today can succeed without the unnecessary personalities so decidedly detrimental to medical publications in the past. For no greater praise can be meted out to a journal than to say of it that its message bears upon its face the exoteric words,—uprightness, honesty, probity.

TRADE-UNIONISM IN THE PROFESSION.

Sir Victor Horsley in his address, delivered on December 12th in the Medical Library of the Sheffield University, showed to a surprising and gratifying extent his contempt for the odium which good Britishers, recently retired from business, entertain for the word "trade." Now "trade" looks innocent enough at first sight, but due to insular prejudices it has arrived at a meaning whose equivalents are sordidness, meanness, and smelliness. That aristocratic minds should take offense at the word "trade" is in keeping with a number of prejudices placed before us to serve as stumbling blocks on the road to progress. But aristocratic minds should be foreign to a profession whose every method and manner breathes democracy.

To better the lot of the rank and file in the profession Sir Victor proposes trade-unionism. After years of experience as a surgeon he feels that he is in a position to utter certain truths, and though his courage is highly commendable, we fear that in blasting the beautiful idea entertained by many patients, that doctors really prefer honor and gratitude to money, he is depriving himself of some of his popularity. In every community there are a number of people who will be quite shocked when they read how Sir Victor views the problem of a livelihood for the physician. Quite often good and honest people pay their butchers and

grocers at once, not because it is a matter of conscience but because the state of their stomachs is uppermost in their minds. This obtaining daily, we might say, the general practitioner is compelled to wait until the good and honest people realize that he, too, is worthy of a remuneration.

That Sir Victor feels the time has come when the idea of the practice of medicine should be stripped of all the foolish chivalry and romanticism, given thereunto by kindly disposed individuals, is evident in all his lines. In fact, the burden of his preachment is against that ever present class, which as a protection against paying their doctors, is most unwilling to enshrine the art of medicine with other mundane arts.

Trade-unionism would mean fair pay for the struggler, a compensation which is denied him under present conditions. That the beginner and he who never reaches the top of the ladder in the profession have but a poor show when emoluments are considered, is a fact that cannot be disputed. This is not peculiar to the medical profession; it is more or less characteristic of all professions. But in medical circles its evidence is glaringly prominent, for the reason that custom has placed many restrictions on the remunerations the smaller fry of doctors ought to receive. So diffuse is this knowledge that even patients, who are ignorant of the many things they ought to know, are surprisingly well informed when the attending physician, handicapped by modesty and by the fact that his name is not famous, sends in his bill. Their excellent work has done much to deprive the physician of his just dues, and though we cannot make an asseveration, we feel that their attitude is somewhat strengthened by previous conversations with medical men of name and fame.

The upper-dog must talk; it is a quality which becomes a virtue with him on account of his exaltedness, but unfortunately his talk is not always of the right sort; often, sad to relate, it is a combination of self-adulation and self-congratulation. Although the virtue, after a number of years, deteriorates into mere drivel, the wrong is done; young men suffer, the eclipsed drag on their weary way to be the butt and ridicule of all classes.

Should Sir Victor's idea of trade-unionism be taken up and prove successful, he will invite some scorn, some hatred, some denunciation. He will be considered a disagreeable person by those who are in power, their assertion, no doubt, being based on Lord Beaconsfield's definition of an agreeable person. But to the thousands, who are working heroically to earn money in an honorable manner, his name shall stand with him of kindly birth, Lear, whose hand had "the itch of humanity."

ORIGINAL ARTICLES.

INTERNAL MEDICINE.

IN CHARGE OF

JESSE S. MYER, M. D.

It is gratifying to note, and attention should be called to the fact in discussing the progress of medicine during the past year, that internal medicine is rapidly receiving recognition in this country as a specialty. In Europe "Innere Medicin" of the Germans has been looked upon as a specialty for many years. Although, for a number of years there have been a few physicians in our larger cities who might, in the true sense of the word, be considered specialists in this branch, only recently has a large number taken up internal medicine in the incipency of their careers. In the past, internists became such through the elimination of other work. Now, however, hundreds are entering the field with a definite view to making internal medicine their specialty. We consider this the greatest evidence of progress in medicine. The field is a broad one, and those entering it recognize the importance of the broadest possible foundation. It is unlike most of the specialties, in that it covers the entire organism and in that the diagnosis usually entails a most careful examination of the entire physical being. Not only this, the internist must be thoroughly posted in laboratory methods of diagnosis, which in itself promises to become a specialty in the not distant future. Every case, therefore, with which the internist comes in touch, calls for a careful examination of the important systems of the body, and the necessary laboratory examinations. The number of patients, therefore, that an internist can and should see is very limited, if he would do his work conscientiously. There is no doubt but that the sins of omission in the practice of medicine are vastly greater than those of commission. The greatest mistakes that are made are of a passive, rather than of an active character, are made through negligence rather than through ignorance. That physician who overlooks a beginning nephritis, an incipient tuberculosis or an early valvular lesion, through an incomplete examination, commits by far a greater error than he who prescribes an overdose of a drug. The one is caused through negligence, while the other may be caused through one of those tricks of the mind of which we are all occasionally victims. It behooves the internist, therefore, to give to each individual patient, who applies to him, a most searching examination, regardless of the character of the ailment for which he applies. In order to do this, it will be necessary for him to content himself with a very limited num-

ber of patients and to measure his success rather by the quality of work done than by the quantity. That internist or general practitioner who boasts of seeing in his private practice from forty to seventy patients a day is a menace to the community in which he lives. Though his mistakes and oversights may never be revealed to him, they are numbered by the hundreds. Progress, then, in internal medicine, means something more than mental progress; it means something more than the perfecting of diagnostic procedures and therapeutic methods; it means moral progress, a desire to give to every patient an opportunity to use an ounce of prevention instead of a pound of cure. It is in this way, and only in this way, that preventive medicine may yield its best results. It is a mistake to believe that preventive medicine may be applied only in diseases of bacteritic origin. Preventive medicine may be employed by the internist through the recognition of the incipient stages of all diseases. When a patient applies to a physician because of a certain disturbance, that physician's examination should not end with the examination of that portion of body to which the patient refers his symptoms, otherwise he may be overlooking diseases of the kidney, beginning consumption, or beginning tabes, etc. We believe that much of the progress that has been made in internal medicine during this year, during the past few years, rests in the awakening of the physician to his absolute duties to his patients, as well as to the science of medicine.

While this paper is supposed to be devoted to internal medicine, it is almost impossible nowadays to separate medicine and surgery. The border-line diseases are multiplying yearly; diseases which a few years ago we felt could never be included in the domain of surgery, are now recognized as surgical in those cases in which a rational internal therapy has been persistently employed and has failed to accomplish results. Among these must be included not only diseases of the stomach, the gall-bladder, kidneys, etc., but even chronic and inflammatory processes and ulcerations of the large intestine, etc. There is no knowledge more important to the internist than a knowledge of surgical indications, for after all it is for the internist to decide when a case ceases to be medical and when it becomes surgical. This knowledge can be obtained only through the close association of physicians and surgeons. There is no better way of obtaining this knowledge, especially with reference to abdominal diseases, than through regular attendance in the operating room and viewing the conditions in the abdomen that have been diagnosed through subjective and objective signs. The time has passed when the internist can speak of the surgeons transgressing upon his field, and when the surgeon can feel that there is no place for the internist. There must be a unison of action between the internist and the surgeon if the best results are to be attained in both medicine and surgery.

In this connection we cannot omit mentioning a most interesting dis-

cussion on the diagnosis and surgical indications of non-malignant diseases of the stomach at the meeting of the British Medical Association during the latter part of last year. The discussion was engaged in by such men as Moynihan, Saunbey, Hartman, Finney, Clark and Moullin. We shall not enter into a consideration of the various points brought out in the discussion, but can highly recommend a perusal of the transactions to those interested in the subject.

Janeway discusses that debatable ground known as the border-line of medicine and surgery. Though asepsis enables the surgeon to do successfully much that could not be undertaken in previous years, he warns against the dangers of unfulfilled predictions and too great optimism. He points out, too, the dangers of bringing surgery into disrepute through taking surgical chance in hopeless diseases, and charging a large fee for so doing. In dealing with border-line cases, it is advisable to obtain as nearly as possible an accurate diagnosis before resorting to surgery; all available means should be employed in order to form a correct diagnosis. If this is not done, unnecessary operations may be performed, or having been begun may have to be repeated in another direction. In support of this statement he mentions, as examples, renal calculus and appendectomy, gall-bladder disease and appendicitis, etc.

The author discusses many questions of interest to both the surgeon and the internist in their relationship to one another. The internist, in many cases, must decide promptly and definitely as to the indications. As an example, he mentions the danger of hemorrhage in cases of protracted jaundice, and points out the importance of deciding early in regard to the probable need of surgical intervention. Operations upon the kidney for decapsulation have shown that the presence of albumen and casts is not a contra-indication to anesthetics and surgical intervention. The physician has not infrequently to consider carefully whether the degree of anemia present is such that he must advise against surgical interference until an attempt has been made to bring about a better blood state. The author questions the advisability of urging patients to dubious palliation, such as artificial anus in an inoperable cancer of the rectum not markedly obstructive. Taken as a whole, the paper simply tends to show the great importance, both to the patient and to the science of medicine, of the internist and the surgeon working together in harmony.

The Mayos make the statement that there is no truthfully recorded case of a cancer of the stomach cured by medical means, but that these cases are nevertheless treated by medical men and necessarily result in 100 per cent mortality. Cancer of the stomach is the most frequent form found in the human body, at least thirty per cent of the total, a tremendous sacrifice of human life almost without an effort at cure. They blame this state of affairs upon the past high mortality of radical excision and the difficulty of early diagnosis. They maintain, however, that the im-

proved technique of the past few years has lowered this mortality to less than 10 per cent. They report eighty-one gastric resections with a mortality of 14.5 per cent. Thirty-four of these were operated upon within the last thirty months with a mortality of eight per cent. Of the total number, five failed to live six months after operation, thirty-eight cases lived six months to a year, twenty-one from one to two years, ten from two to three years, four from three to four years, and one is alive and well after four years and ten months. They consider the clinical history and symptoms of the greatest value in early diagnosis. At best, however, all known means of diagnosis merely give rise to a suspicion, and if we cannot disprove it, exploratory operation is called for.

Deaver, in the discussion of this paper, urges upon the internist the importance of familiarizing himself with the pathology of the living being in the operating room. He, too, lays great stress upon laboratory methods, for, as he says, hydrochloric acid may be present in cancer of the stomach and lactic acid present in diseases other than cancer. In a choice between symptoms and physical signs he relies more upon the former than upon the results of the physical examination. There have been so many cases in which a palpable tumor disappeared, after stomach rest had been obtained by gastroenterostomy, that he has found it well-nigh impossible to diagnose unerringly a tumor as malignant until either the constitutional symptoms were well advanced or the abdomen was opened. The character of the vomitus and progressive emaciation are to be most relied upon when the case is at all advanced. Emaciation, however, is not to be accepted merely on the patient's word. The statistics from the clinics of Kroenlein and Mikulicz show that patients who have undergone an exploratory laparotomy in which no further operative treatment was possible, actually lived longer than did those whose disease was so far advanced as to make even an exploration unjustifiable. For this and other reasons, Deaver is a firm believer in exploratory laparotomies where justifiable indications are present. He believes that there is too much surgery being done upon the stomach at present. He considers indigestion as belonging first to the internist, and if through rational treatment persistent symptoms are not relieved, surgical investigation to discover and relieve the physical conditions is not only justifiable, but indicated. He believes that every case of gastric indigestion not cured by rational treatment will be found to be due to lesions of the gall-bladder, duodenum, pancreas or the stomach itself.

In an exhaustive article, Goldschmuecker reviews, in detail, the results of surgery in perforation in ulcer of the stomach, presenting about 300 literature references leading up to the present date. Inasmuch as this subject is one of special importance to the internist, we deem it well to call attention to it here. It would be utterly impossible to call attention to all the points brought forth in this exhaustive article, but allusion may

be made to a few of the conclusions reached, especially in reference to diagnosis. Perforation of ulcer of the stomach occurs more often among women than men, and the women thus affected are younger than the men. The previous history is exceedingly important in arriving at a diagnosis, because, in most cases, the history of a long-standing affection of the stomach may be elicited. For sudden perforation there is no absolutely certain sign; however, sudden, severe pain localized in the gastric region should always direct one's attention to the possibility of the existence of this condition. Localized peritoneal friction sounds in the gastric region are always important. Early vomiting occurs in the majority of cases; the abdominal walls are exceedingly hard; the disappearance of the liver dulness has only slight value, as a thorough diagnostic sign of gastric perforation it is greatly overestimated. If possible, cases should be operated upon within the first twelve hours, since the chances for recovery after this are greatly diminished. The results of operation within the last few years have been materially better. Of course, where possible, the patient should be operated upon in the hospital rather than at home. About 50 per cent of the cases are cured through operation.

In reviewing a large statistic of intestinal carcinoma, Boas comes to the conclusion that the chances for early diagnosis are very poor, indeed, because of their latent development. Eighty per cent of all rectal carcinomata which are within view and may even be palpated, come to the surgeon too late for operation. This being the case, carcinoma of other portions of the intestines, offer even poorer chances. In review of 25 cases of cancer of the small intestine, Kanzler also considers the clinical diagnosis impossible in 50 per cent of them. The early diagnosis, which of course, is all the more difficult, seems well nigh impossible in a large percentage of cases. These cases frequently occur before the thirtieth year, seldom produce bleeding and the clinical manifestations may be present for one to ten years.

In chronic diarrhea not responding to other methods, Gant has performed appendicostomy. He recognizes the fact that the original cause of chronic diarrhea is most often above the ileo-cecal valve, but also believes that "the lesions in the colon, sigmoid and rectum thus produced not infrequently remain as an independent and continuing cause of the diarrhea long after the original ailment * * * is relieved or cured." He reports nine operative cases, seven of which resulted in cure after other methods had failed. One case was unsuccessful because of a stricture of the transverse colon. One case died as a result of gangrene of the appendix and cecum, showing that the operation is not without its own dangers. Irrigations of saline solution, ice water, nitrate of silver, etc., were used. Three resistant cases of amebic dysentery were especially successful under this treatment.

Bennett recommends appendicostomy in the treatment of dysentery as well as some other intestinal disturbances. Ewart also recommends it in certain diseases of the caecum, ilium and colon. He has succeeded in curing cases of mucous colitis in this manner, that have withstood all medical treatment. One of the exponents of this procedure is Tuttle, who reviews the literature on appendicostomy and recites the results in 77 cases performed in various conditions. Most of these are conditions usually considered medical in character. Operations were performed in 44 cases, following which there were six deaths and thirty-eight recoveries. The deaths were due to complications and not to the operation alone. Operations were also performed for mucous colitis, tubercular ulcer of the colon, chronic constipation, etc. We firmly believe that there are many cases of dysentery and ulceration of the colon, in which surgical interference of such a simple and safe nature might be thoroughly justified. In this, however, as in all other border line diseases, the internists recommend and will be upheld by all right-thinking surgeons, that even this operation should not be done until all possible medical means have been exhausted.

Among those diseases which are on the border-line between medicine and surgery, gall stones may be considered one of, if not the most important. It is maintained by many surgeons and few internists that gall stones should always be operated when the diagnosis has been fixed. Rosenheim believes that a rational therapie should be first carried out and an effort made to cure the patient through medical means. If these fail and recurrences occur, then surgery should be resorted to. While this is the view held by most of the internists, there is still much doubt as to whether or not delay could be brooked when one feels reasonably sure of the presence of gall stones. One never knows when complications may occur and when carcinoma may develop as a result of constant mechanical irritation. The percentage of cases, of course, in which these complications do occur is few; however, there is a question as to whether the dangers of delay are not greater than the dangers from surgical interference carried out by modern experts. Based upon observations of others as well as upon his own experience in the treatment of gall stones, the v. Aldor discusses the medical treatment of gall stones and recommends the greatest care in the selection of the surgical cases. According to Riedel's figures two million people in Germany have gall stones, but of this number only one hundred thousand have "gall stone disease," that is, have clinical manifestations. He calls attention to the fact, too, that in autopsies many cases of gall stones are discovered in which there has been no evidence of their existence during life, and in which the mucous membrane shows no pathological changes. The author has frequently seen cases in which gall stones unquestionably existed, enter into a latent stage without the gall stones ever having been passed. On the other

hand he has seen cases, in which a large number of gall stones have been passed, persist in spite of the fact. Korte states that he has operated upon cases with typical symptoms of cholelithiasis and found an infectious cholecystitis with no gall stones present. In seventy-six operations he has made careful bacteriological examination with positive results in all.

These facts, together with many interesting observations of the author himself, lead him to believe that surgical interference is justified in a very small percentage of cases. The early operation in cholelithiasis is seldom if ever indicated because gall stones is a benign disease in which there is a tendency to absolute cure. The treatment will depend, of course, upon the individual case. The author, however, leans naturally to the Carlsbad treatment.

Even enteroptosis in all of its phases are being operated upon by surgeons, who claim excellent results. We fear, however, that in these cases the same good results cannot be expected as are obtained in other border-line conditions. By enteroptosis one usually understands splanchnoptosis, in which all of the abdominal viscera have a tendency to drag downward. There are probably no well authenticated cases of enteroptosis in the true sense of the word; i. e., in which only the intestines are involved. An operation, therefore, for splanchnoptosis, if it is to be complete, would necessitate a "pexy" of the kidneys, the liver, the stomach, and even the intestines. This, of course, would prove practically impossible. However, it is often possible to replace those organs which are producing the chief symptoms, namely, the kidneys. Operations are being done and good results are being claimed by the surgeons in hepatopepy, gastropexy, etc. We fear that the surgeons too often look upon the exit of the patient from the hospital as a cure and don't follow their cases long enough. Many and many of the cases being reported far and wide by the surgeons as recoveries from this and that condition are still being treated by the internists for the same old symptoms.

Rovsing, of Copenhagen, reports, for instance, his results in 100 cases of nephropexy, 18 of hepatopepy, and 54 of gastropexy. He states that the results from these operating measures have been most excellent. While he recommends the use of the abdominal supporter in cases of relaxed abdomen, he believes that no benefit can accrue from them in those cases of enteroptosis which can only be attributed to an hereditary tendency. While his arguments are in a measure rational, it must not be forgotten that simply by stitching the stomach or kidneys back in position he does not in any sense relieve the patient of this "tendency." These in our opinion, are just the cases from which little or nothing may be expected surgically.

Eve has also performed a number of operations for gastropexy, in which he attached the lesser curvature of the stomach to the liver, and

where the liver was displaced it was placed in position and attached to the anterior abdominal wall. The probabilities are that the autopsy in this case will show both the liver and the stomach to be just where they were previous to operation.

Ulcer of the stomach has received, during the past year, its usual amount of consideration. The fact that ulcer of the stomach and duodenum may so closely resemble in their symptomatology, the ordinary forms of nervous dyspepsia, and cholelithiasis, the efforts of those who are interested in gastrointestinal diseases are being concentrated toward finding a symptom, that will in a way be pathognomonic. Heretofore, the cardinal symptoms of ulcer of the stomach have been hyperchlorhydria, vomiting, gastralgia, and the vomiting of blood. The work of Boas on occult hemorrhage has opened a new field in the diagnosis of ulcer of the stomach, and one which is deserving of all the attention that it has received during the past year. There is little doubt in the mind of those conversant with the subject, that traces of blood in the feces and stomach contents in the absence of other causes, point to the probability of ulcer or carcinoma of the stomach and intestines. The one point toward which all are striving now is a reliable and simple method of determining the presence of blood pigment in the feces. It is absolutely necessary of course, before too great stress is laid upon the finding of blood, to eliminate the other possible causes of blood in the gastrointestinal tract. Indeed, it has been shown that even slight bleeding from the gums, in cases of pyorrhea alveolaris, may show the presence of blood pigment in the feces. Therefore, these factors must be entirely eliminated, even in the presence of symptoms that may be interpreted as those of ulcer of the stomach before one should be willing to say absolutely that the blood, present in the feces, is due to this cause. It was shown by Boas, too, that the ingestion of poorly cooked meat may also reveal the presence of blood pigments in the feces and that the patient should be put on a diet free from meat for several days before the examinations of the feces are begun. This, of course, is best accomplished in a hospital, where the patient's diet may be completely controlled. The tests that are most relied upon and which have been most efficacious are the guaiac-turpentine, aloin, benzadin and the spectroscopic tests. Mathieu and Roux in their observations upon the examinations of the feces for occult bleeding came to the conclusion that the test in normal conditions is negative. In acute ulcer it is almost constant, and in chronic ulcer frequently present. If the occult bleeding continues in spite of treatment, one must think of carcinomatous degeneration. In carcinoma, traces of blood are almost constantly present. In fourteen cases they found blood positive 13 times. In carcinoma of the colon, blood is less frequent. It is very often positive in other forms of intestinal ulcerations and cirrhosis of the liver. Ewald lays great stress upon the examination of the feces for

occult hemorrhage, and recites his experiences which are altogether favorable. Carlson recommends the use of hydrogen dioxide as an oxidizing agent, because in his opinion a reaction is more definite. He enters into the chemistry of the subject. Friedenwald and Rosenthal published a series of results obtained from the examination of the feces for occult hemorrhages in stomach affections generally. They never found blood in any of their cases of chronic gastritis, atony of the stomach, hyperchlorhydria, hypersecretion, acute gastritis, nervous dyspepsia, etc., but did find it in 74 per cent of all examination of ulcer cases. They found it also in 82 per cent of their cases of cancer of the stomach. Falloise regards the presence or absence of "gastrorrhagies trustes" as a most valuable differential sign in ulcer, chronic gastritis, achylia, carcinoma, etc. Benedict also recites most satisfactory results, employing a modification of the Boas test. Jaworski and Korolewicz made a series of very interesting observations with reference to the presence and absence of blood in the feces in various conditions which may simulate ulcer of the stomach and duodenum. They employed Weber's modification of the guaiac-turpentine test and find it very reliable. The tests were also made with reference to the negative and positive actions produced through the different foods and drugs. It was found that no reaction was produced by human bile, raw or cooked egg albumin, raw and cooked yolk, sweet milk, cream, tea with sugar, black coffee, cocoa, beef broths, cheese, butter, bacon, turnips, apples, plums, cooked spinach, breads, the green vegetables, etc., etc. The reaction was positive, however, when the patient had taken various kinds of roast meats, chicken, calf meat, ham, smoked meats, calves brain, and among the drugs, iron chloride, iron sulphate, Bland's pills, etc., etc. These observations show the importance of placing a patient on a restricted diet before drawing definite conclusions. Boas reviews in this excellent article the methods of examining the feces for occult hemorrhage, and recommends most heartily Weber's modification of the guaiac-turpentine test. The modification by Weber consists in the conversion of the haematin into an acid combination that is readily soluble in either. The pigment is then extracted by ether and the test with guaiac-turpentine is then applied. He shows the great importance of this test in the differentiation of such conditions as ulcer of the stomach, benign pyloric stenosis, and pyloro-spasm. He points out also its importance in the diagnosis of carcinoma of the stomach and tuberculous ulcer of the intestines. He lays stress upon the fact that too much significance must not be placed in the negative reaction where carcinoma is suspected, for it is possible in carcinoma to have no blood present.

Hemmeter recommends a new and unique method, which if practical, will prove a most valuable addition to our methods of diagnosing ulcer of the stomach. It has been shown experimentally that if one takes subnitrate of bismuth in suspension and moves about so as to distribute

the bismuth over the walls of the stomach, the stomach may be outlined for from three to six hours with the X-Ray. In other words, the subnitrate of bismuth will cling to the walls of the normal stomach for about that period of time. Hemmeter claims to have shown, however, that if this same method be applied to patients with ulcer of the stomach, a larger amount of subnitrate of bismuth clings to that part of the wall of the stomach, filling up, as it were, the ulceration and adhering there for a longer period of time. He claims to have been able to demonstrate the bismuth at the point of ulceration from 24 to 36 hours later. The patient, after the first suspension of a heaping teaspoonful of bismuth is taken, is instructed to lie upon his back, and a few hours later the fluoroscope is used. If no dark shadow is found the same procedure is repeated a day or two later, having the patient lie upon his abdomen. In this way he maintains that the ulcer can ultimately be located. As yet, the method has received but little attention, and until further reports appear, little can be said of its practicability. Turck has shown experimentally that ulcer of the stomach and duodenum can be produced in dogs by feeding them bacterium coli communis for a long period of time, and thinks that he has at last solved the problem underlying the etiology of ulcer of the stomach. Zironi in his experiments upon rabbits succeeded in producing ulcer of the stomach at intervals varying from 11 to 60 days in six out of fourteen rabbits. His method consists in resecting the vagus below the diaphragm.

The medical treatment of ulcer is a subject that should always elicit the interest of those who are desirous of giving their patients the benefit of every possible chance before resorting to the knife. Haberman reviews of the work of Lenhartz at the Eppendorf Hospital in Germany and reports most excellent results. The method followed is about as follows:

Absolute rest in bed for at least four weeks. An ice bag is applied almost continually to the gastric region. The ice bag is preferred, because it prevents gas expansion and limits pain and peristalsis as well as hemorrhage. On the first day the patient gets from 200 to 300 cm. of milk in the course of 24 hours, a tablespoonful at a time, and from two to four raw eggs. Two to three times a day two grams of sub-nitrate of bismuth are given; the milk is increased at the rate of 100 cm. a day and one egg, so that at the end of the first week 800 cm. of milk and 6 to 8 eggs are being given. In the third week, rice and oatmeal and zwieback are given. The constipation in the first week receives no treatment. During the second week the patient received injections of glycerin or warm water. Blaud's pills are given throughout. At the end of the fourth week the patient is permitted to get out of bed and to leave the hospital from the sixth to the tenth week. Following this treatment hemorrhage has occurred in but 8 per cent of the cases, as compared with 20 per cent by other methods. The hemoglobin increases from 6 to 7 per cent a

week, and the weight about 2 pounds. Senator reviews the recommendations of Lenhartz, viz: that ulcer cases, even immediately after a hemorrhage, should have a strong albumen solution in order to replace as quickly as possible the blood and strength that has been lost. This was recommended in the place of exclusive rectal feeding, which had been the generally accepted treatment in cases with hemorrhage. Along the same lines the author recommends the employment of gluten, fat and sugar together with small amounts of albumen. The advantages claimed for these articles of diet are, that being concentrated forms, they do not act as a weight in the stomach, nor distend the organ; they have a sedative action and do not produce hemorrhage; they counteract the surplus amount of acid present, and are easily digested and highly nutritious. Immediately after the hemorrhage he gives, every half hour, a tablespoonful of gelatin solution (20 to 200), and follows this with small quantities of cream and butter, so that in 24 hours the patient has received 30 grammes of butter and 250 cc. of cream (900 to 1,000 calories). After several days the patient is given milk and eggs, and later still scraped beef. The gelatin decoction is discontinued as soon as the hemorrhage ceases so that it may be resorted to again in case of fresh hemorrhage.

Eicheler conducted a series of observations on some thirty patients with a view to testing the value of Sahli's desmoid reaction. This reaction is based on the fact that raw connective tissue fibres are digested in the stomach alone and only when the secretions of pepsin and hydrochloric acid are relatively normal. Sahli recommended the ingestion of small rubber bags containing methylene blue, tied shut with raw catgut. As soon as the catgut is digested the methylene blue or iodoform is liberated and soon makes its appearance in the urine. It should appear within twelve to eighteen hours. If the secretions are not up to normal, then the catgut is either not digested at all and the little bags are expelled with the feces, or is digested very slowly and the methylene blue makes its appearance in the urine at a much later period. Eicheler found in his series of investigations that the Sahli method is very reliable and corroborated his findings by a comparison with the chemical findings in the stomach contents. Kuehn conducted a similar series of observations on some fifty-four cases and corroborated in every way the claims of Sahli. He praises the method very highly and believes that in a large degree it can supplant the use of the stomach tube. Horwitz tested the desmoid reaction in a series of 44 cases, of various affections, in which first the gastric contents were examined. Their results were highly satisfactory and corroborative of Sahli's results. In cases in which the tube is contraindicated, they consider this test an admirable one. Aldor considers the desmoid reaction of little or no value, while Alexander and Schlesinger report a similar outcome of their investigations. Einhorn maintains that catgut will also be digested by intestinal juices. Therefore, it is not re-

liable in testing gastric functions. Hirschler attributes little value to it, maintaining that the Ewald and Boas methods are still the best. Kaliski considers the test a most excellent one, and believes that one may even form some idea as to the degree of acidity in the stomach. The deep blue color of the urine, occurring within from 4 to 7 hours, speaks for hyperacidity; while its occurrence in from 7 to 12 hours, for normal acidity. Roux and Riva consider the catgut indicative of gastric digestion, because of their observations in a case of duodenal fistula. They introduced pieces of catgut into the fistula and found them in the feces undigested.

The test diet recommended by Schmidt and Strassberger in studying the intestinal functions, have received the widest recognition. They have perhaps done more in the past year or two toward showing the great importance of careful macroscopical, microscopical and chemical examination of the feces, than any other authorities on their subject. Their test diet consists of about the following: 0.5 liters of milk and 50 gm. zweiback early in the morning; for breakfast, 40 gm. oatmeal or 0.5 liters of oatmeal gruel, 10 gm. butter, 200 gm. milk, 300 gm. water and one egg (strained) for dinner, 125 gm. chopped beef (weighed raw), browned over but still raw inside, and 250 gm. mashed potatoes (made with 190 gm. potatoes, 100 gm. milk and 10 gm. butter). The afternoon meal is like the earlier meal, and the supper like the breakfast. A tablet of 0.3 gm. of pulverized carmin is given usually at the commencement and conclusion of the test diet, which is kept up for three days or longer. The appearance of the carmin which passes through unchanged, indicates the beginning of the excreta coming from the test meal. Portions of this is then examined carefully, macroscopically for evidence of parasites, foreign bodies, remnants of connective tissues, etc. Microscopic examination for all the morphotic elements in the feces, the chemical tests for bilirubin, hydro-bilirubin, blood pigment, etc.

Einhorn conceived the plan of attaching solid foodstuffs to porcelain beads and then to have them pass through the stomach and bowel in order to see what remained attached to the tube. It is self-evident that a substance which is entirely digestible will disappear, whereas indigestible substances will be found in the feces attached to the beads. Through this means he was able to determine how the various foodstuffs behaved in the stomach and bowel of apparently healthy persons. To test the work of the stomach alone, the beads, with the food substances attached, were tied to a silk thread 50 cm. long; the beads were swallowed and exposed to the action of the gastric juice four to six hours and then withdrawn. Attached to the beads were catgut and meat, raw tendon, raw chicken skin, raw potato, etc. These experiments in healthy people show that both catgut and fish bones are digested in the stomach, whereas boiled or raw meat, raw chicken skin, and raw as well as boiled potatoes do

not disappear in the intestines. Tendon, however, remains undigested. Raw potatoes sometimes disappear entirely, sometimes pass through the intestines unchanged. He also carried out a series of experiments testing the gastric functions according to the methods described by Ogata, Schmidt and Sahli.

The test recommended by Salomon for carcinoma of the stomach has been widely discussed and many observations published pro and con. The test recommended by him is as follows: (1) Patient received fluids, 8 a. m., and fluids and food free from albumin at 2 p. m. (2) Stomach is washed clean, 9 p. m. (3) Abstinence from everything during night. (4) Stomach lavage twice with 400 cc. physiological salt solution next morning. (5) This solution is tested with Esbach's and Kjeldahl's method for total solids. Salomon's conclusions are as follows: (1) In all cases of carcinoma of the stomach Esbach's reagent produced a flocculent precipitate and Kjeldahl's method showed more than 25 mg. total solids per 100 cc. (2) The majority of the other stomach affections (nervous dyspepsia, chronic gastritis, gastropnoia) produced only at most a slight cloudy precipitate with Esbach's and 16 mg. Kjeldahl. (3) These findings (as in 2) were also present in chronic ulcers. Fresh painful ulcers were not examined. (4) When no flocculent precipitate was present with Esbach's, ulcerative processes in the stomach were thought improbable. Reicher gives the results of Siegel, Berent, Gutmann and Richtenstein, all of which have shown more or less uncertainty of this method. Reicher shows that this reaction can take place in the presence of serum albumen, serum globulin, albumoses, peptones, nucleo-proteids, purinbases, mucin and mucin-like bodies as all these are precipitated by Esbach's reagent.

Though the internist may not have frequent occasion to use either the esophagoscope or the bronchoscope, for those conditions are rare in which they are indicated, it is nevertheless, necessary that much stress should be laid upon their application. The magnificent work of Killian of Freiburg, von Schroeder of Vienna, and others are worthy of the greatest recognition. Killian especially reports the diagnosis and removal of foreign bodies in the bronchi, the diagnosis and dilatation of stricture of the bronchi, the diagnosis of the presence of growths in the bronchi and trachea, etc., etc. Diagnoses of this sort could not possibly be made without such an instrument as the bronchoscope, and if it were possible to correct the conditions thus diagnosed, it would require the most skillful surgical procedures. The bronchoscope, a straight tube, varying from 20 to 30 cm. in length is introduced directly down through the larynx and trachea into the right or left bronchus with comparative ease. And through the use of forceps, curettes, etc., foreign bodies, small tumefactions and strictures have been eliminated. Until the last year, this work was in the hands of a few, but during the past twelve months it has been receiving attention from various sources. The esophagoscope, while

it may be introduced with the same ease and with as little danger, has, perhaps, not yielded as satisfactory results, because the conditions for which it is used may be diagnosed almost as well by other methods, and, as a rule the indication for its use are not as urgent. The patient, of course, is put to considerable discomfort, and as a rule, will not yield to the application of these instruments unless it is absolutely necessary. The experience of some is that the instrument cannot always be successfully introduced the first time, and that the patient will not often permit its use the second. However, they are diagnostic instruments of precision, which should be resorted to whenever the diagnosis cannot be made by other means. One who has viewed the work of Killian and his assistants will certainly have no hesitancy in using or recommending the use of the bronchoscope and esophagoscope, if the diagnosis cannot be made otherwise. Yankauer reports the removal of a foreign body from the bronchus of a child 10 months old through the bronschopi. A piece of orange was aspirated into the right bronchus. Because of the age of the child it was necessary first to perform a tracheotomy and then to introduce the bronchoscope. From a large number of cases upon which von Schroeder has used the bronchoscope for diagnosis of diseases of the mediastinum and lungs, he reports three cases, two of which were primary carcinomata of the lung. These cases were diagnosticated by means of direct inspection of the lesion through the bronchoscope and he says he believes that by the use of the bronchoscope many malignant growths of the lungs can be diagnosticated positively, but that the diagnosis can also be made in many cases without this aid (physical findings, X-Ray, etc.). That only when the differential diagnosis as to the pathological process of the lung and mediastinum is to be established are the bronchoscopic and laryngoscopic examination of value. In primary carcinoma of the bronchi or esophagus, tumors of mediastinum and aneurism, these special means of diagnosis are of great help and may be combined with esophagoscopy. He does not consider an aneurism as a special contraindication to examination of the trachea and bronchi or esophagus, and he concludes that bronchoscopy is indicated and of value in indefinite diseases of the lungs as an aid to diagnosis.

The value of the sigmoidoscope in the diagnosis of diseases of the sigmoid is beginning at last to receive from internists its proper attention. Heretofore, the instrument has been used almost exclusively by those making a specialty of diseases of the rectum and surgeons in general. The internist, however, is getting away from the idea that he must use no instruments in his work. In fact, he is beginning to realize more and more that it is often through these instruments of precision only that he is able to make definite diagnoses. The conditions, in which the internist has an opportunity to employ the most reliable sense, namely, the sense of sight, are few, and it is well indeed that he should permit no

such opportunities to escape him. It is very often necessary in order to locate diseases of the large intestine to exclude the sigmoid as a possible location of the trouble, or, through the use of the sigmoidoscope to be able to locate the trouble there. There are unquestionably many cases treated as colitis, when in reality the trouble is localized in the sigmoid and rectum. Through the proper manipulation of this instrument, known by some as the recto-romanoscope, it may be introduced from 25 to 35 cm. without causing any great distress to the patient, and the entire rectum and lower portion of the sigmoid may be viewed in their entirety. Schreiber, H. Strauss and others have pointed out the importance of introducing either the proctoscope or the sigmoidoscope under the continuous aid of the eye. The instrument should be introduced, according to them, not more than two or three inches, with the obturator in position, the obturator should then be removed, and under direct or reflected light, the instrument carefully introduced its full length. In this manner there is no danger, whatever, of the perforation of the rectum or sigmoid, such as have occurred in the hands of those who endeavor to introduce the instrument blindly. St. Kelen recommends the use of Strauss's rectoscope; with a light at the distal end, and describes the technique for using the instrument with absolute freedom from danger. The methods described by him is practically the same as that mentioned above. Mummery points out the dangers of basing diagnoses of colitis upon symptoms alone. Every case should be carefully examined with the sigmoidoscope. In this manner, cases supposed to be colitis are often found to be benign or malignant tumors or ulcerations.

The work on opsonins and vaccine has been attracting much attention from clinical sources, and promises to be of great clinical significance in the future. Wright, of London, has perhaps presented our most practical knowledge on the subject, and has perhaps done more than anyone toward making the opsonic theory popular. Metchnikoff, many years ago, recognized the role of the phagocytes in the resistance of the body against disease. To Denys and Leclef, however, belong the credit of showing that to the liquid portion of the blood belongs a power of causing white blood corpuscles to ingest bacteria. It was afterwards shown that the serum from guinea pigs inoculated with the pneumococcic toxins produced a more active phagocytosis than did the normal serum. Following this came methods by which the amount of phagocytosis could be estimated. Wright, aided by the work of Leishman and Neufeld and Ripman, perfected a method of determining the phagocytic property of serum and found that the sera of all apparently healthy individuals contained practically equal amounts of these bacteria-affecting substances, which he called opsonins. The term is based upon the word opsono, meaning, I prepare for food. He found that the serum of persons known to be suffering from a certain disease was found to contain greater quantities of opsonins than

that of normal individuals. He has applied the knowledge of this fact to practice and through the aid of it claims to have been able to make early diagnoses, as in tuberculosis, when other methods had failed to reveal it. He found also that even though the opsonins were found normal, and infection was known to exist, that the opsonins were not so readily destroyed by heat as are the normal. He applies this fact also in diagnosis. Wright and Douglas have also found that the quantity of opsonins can be altered by standardized cultures of bacteria, which they called vaccines. When the vaccines are administered there occurs ultimately a rise in the amount of opsonins. In this way it is possible to raise the opsonins above that of normal sera. The dose of vaccines is regulated according to the opsonic index, which is the relation of the quantity of opsonins in the blood of one individual to that of a normal individual. If the theories of Wright be confirmed by the careful and prolonged observations of others, the amount of practical good that may come of it is unlimited both as to diagnosis and to the prevention of disease.

Mention must be made, in this connection, of the advancement in the treatment of tropical diseases. For some years the Germans, Italians and Englishmen have given a great deal of attention to this subject, because of their possessions in the tropics. It is during only the past two or three years, however, that the Americans have had any great incentive to study these conditions. Without entering into a discussion of the advance in the knowledge of conditions peculiar to the tropics, we would simply mention the work on bubonic plague, dengue, yellow fever, malta fever, malaria, beri-beri, and uncinariasis. Our interest in this work originally brought about by our possessions in the Philippines will receive a new incentive through our occupation of the canal zone. There is no question but that one of the greatest problems to be solved there is the prevention of diseases peculiar to that country among the workmen employed. President Roosevelt has recognized that, without the proper state of sanitation, the canal cannot possibly be completed, and it is gratifying to note that Dr. Gorgas will probably receive an appointment on the canal commission. He has already done admirable work, and already yellow fever has been practically eliminated from the zone. Gorgas calls attention to the great mortality on the Isthmus of Panama during the French occupation, and compares these figures with the ones that have been attained during American occupation of the canal zone. The result of his work has been the practical elimination of yellow fever from the zone. In June they had sixty-seven cases, in July forty cases, in August twenty-seven cases, in September seven cases, in October three cases, and none in November and December. Of course, it is too early to say that yellow fever has been entirely eradicated from the Isthmus. This cannot be confirmed with any certainty until the full life of the female *stegomyia* has been passed. He has seen them live in captivity for

150 days and believes, therefore, that several months will be necessary to determine whether or not yellow fever has been entirely eliminated from the Isthmus.

Graupner, following a series of observations and experiments, believes that the functional tests of the heart must take into consideration the blood pressure, the volume of the heart beat, the degree of tension in the vessels as well as the mechanical pressure, which stretches the walls of the vessels. He lays great stress upon the blood pressure as an index of the functional capacity of the heart. In order to demonstrate that changes in the blood pressure are an indication of the sufficiency of the myocardium, he recorded the blood pressure every half minute in individuals using a certain group of muscles. He devised an instrument which he calls the ergometer, for this purpose. In health there is very little variation in the blood pressure during exercise. Great variations of the blood during exercise, he considers an index of the functional capacity of myocardium. He believes that in even valvular lesions, it is possible, in this manner, to determine whether the myocardium is also involved.

Rosengast reports five cases of arteriosclerosis of the gastrointestinal tract, and reviews the atypical findings of more or less localized arteriosclerosis. He says that a tortuous temporal artery, a normal pulse, normal blood pressure, normal urine, etc., are not positive criterion for normal arteries generally. Also, that these findings may be accompanied by stenocardia without stenosis of the coronary arteries. The symptoms from the gastrointestinal tract in generalized arteriosclerosis are frequently due to primary arterial changes of that system, instead of secondary conditions (passive congestion, reflex from heart, etc.). Some of the symptoms of this primary condition are rumbling and painful distension of the abdomen, especially in the right hypochondrium; intermittent colic and regurgitation of gas, which gives a temporary relief; occasional hemorrhage; sometimes the passage of flatus with or without feces; irritability; restless sleep, the patient being disturbed frequently early in the morning by distension and pain in the stomach, which is sometimes relieved by sitting up and taking food; appetite good; bowels somewhat constipated. Physical findings are meager. Digestion normal. HCl. sometimes increased; pulse rate usually gradually increased; heart dullness enlarged, soft systolic sound and accentuated second aortic sound; and increased blood pressure. Alcoholics with eczema ani and hemorrhoids have frequently been observed to have this condition. The condition had remained undiagnosed for years until an attack of stenocardia has directed the attention to the cardio-vascular system. Men with strenuous occupations seem predisposed. As to the differential diagnosis, many abdominal conditions must be differentiated according to the distension and localization of this condition, as follows: Gall-stones, appen-

dicitis, foreign bodies in the ureter, intussusception, intestinal obstruction, ulceration, etc.

He illustrated the difficulty of diagnosis by three cases which were operated upon under mistaken diagnosis.

Schmidt discusses the relationship between gastrointestinal and heart diseases, and shows how affections of the one may often be taken for those of the other. It is quite natural that gastrointestinal disturbances should arise in diseases of the heart because of the stagnation in the portal system. Much of the gas produced in the intestines and introduced into the intestines with food, is absorbed and taken up into the circulation. In the event of a venous hyperemia, therefore, the absorption of gases does not go on properly, and marked distension with all of its unpleasant features occur. Frequently, therefore, gastrointestinal symptoms and cardiac disturbances are more prominent than are the primary cardiac symptoms. On the other hand, cardiac symptoms are often produced through the disturbances of the gastrointestinal tract. These symptoms may be divided into three classes: (1) Tachycardia and allorhythmia. (2) Angina pectoris. (3) So-called asthma dyspepticum. The first class of cases occurs after mistakes in the diet in persons who have chronic dyspeptic troubles and manifest themselves with rapid, arrhythmic pulse and palpitation of the heart. The second class of cases occur periodically, usually after the ingestion of food, but often upon an empty stomach, and are characterized by a feeling of pressure, anxiety, paleness, small, frequent, irregular pulse, palpitation of the heart, dyspnoea and other peculiar sensations. The digestive symptoms may remain entirely in the background.

The third group is characterized by dyspnoea of a subjective type. It resembles more the attacks of cardiac asthma than those of bronchial asthma. The affection is purely of reflex origin. The author closes this valuable article with a few words on the diagnosis, prognosis and therapy of these affections.

Stengel discusses arteriosclerosis as a general disease, and recognizes three stages, a preliminary one, in which the symptoms, due to the original factors, are confused with those of the arterial disease. Secondly, a middle period, in which the arterial disease is recognized, but in which the secondary organic changes are very important. Third, a final stage, in which circulatory and organic failures are prominent. Ophuls goes into the pathology of arteriosclerosis of the aorta in a report of seventy-five cases. Rodhe calls attention to gastrointestinal disturbances due to arteriosclerosis. He enters into the clinical symptoms of this condition, and shows the importance of a careful consideration of this as an etiological factor in abdominal disturbances. The syndrome may simulate ulcer, nervous dyspepsia, or even gall-stones, and the autopsy may show unsuspected hardening of the vessels of the stomach, or the intestinal arteries. Gastralgias due to arteriosclerosis vanish under diuretics and heart se-

datives. Erlenmeyer believes that the high arterial pressure in cases of arteriosclerosis is a self-regulating process. He thinks that when the blood pressure is low, treatment should aim to raise it. In cases where it is high, efforts should be made to lower it. Osler, in a most excellent article, reports a series of sixteen cases of aneurism of the abdominal aorta, observed at the Johns Hopkins Hospital. Fourteen of them were men and two women. The cases were characterized by paroxysmal pain in the abdomen, pulsation, etc. In the differential diagnosis he called especial attention to the importance of excluding dilatations of the right ventricle, certain hysterical symptoms in women, anemia, aortic insufficiency, and sclerosis of the aorta, in all of which abdominal pulsations are increased. Dieulafoy calls attention to angina of syphilitic origin, and recites striking examples of their cure through the use of daily injection of biniodid of mercury. Syphilitic aortitis is a subject which has not received sufficient consideration, and these cases serve to direct attention to them.

The physiology and pathology of the gastrointestinal organs is still a fertile field for investigation. Those interested in the work realize that only with the perfection of such knowledge can a rational therapy be inaugurated. Interesting observations have been made recently with reference to the secretions of the liver, pancreas, stomach and intestines. Ludwig von Aldor, reviewing previous investigations made upon the subject of fat-digestion in the stomach, the author attributes to Marcet the first positive statements in 1858. Cash corroborated Marcet's finding by experiments with the extract of the stomach mucous membranes of dogs, and said that it was of ferment nature. Klemperer and Scheurlen demonstrated this process in dilated stomach of human beings, and attributed it to a process of fermentation. Kluf and Bunge have substantiated the findings of previous authors regarding the fat-splitting function of the stomach, but the latter says it is caused by the action of bacteria. Volhard and Stade have shown that this function is not only present in the stomach, but they declare that it is due to special ferment which they have named "steapsin." They give it a definite relation to the other ferments of the stomach, and claim for it clinical importance. From von Aldor's investigation of eighteen cases he concludes: (1) That a fat-splitting process actually takes place in the stomach. After Ewald's breakfast he found fatty acid varying from 7 per cent to 10 per cent. (2) The amount of this digestion is variable and independent of the other factors of the stomach chemism. (3) That there is no satisfactory proof that it is due to a specialized ferment. Robson writes interestingly of chronic pancreatitis, and incidentally recites a case which had probably had its origin in an accessory pancreas. The case was rather unusual, in that it was not accompanied by gall-stones, but began with an inflammatory process, having its origin in the duodenum. A marked degree of anemia which exists in these cases is not necessarily attributable to the cholemia, be-

cause in cases in which no cholemia exists there may, nevertheless, be a marked degree of anemia. Brugsch finds that in diseases of the pancreas there is a marked diminution of fat resorption, resulting in a loss of 50 to 60 per cent of fat, but that the fat-splitting process is not interfered with. Therefore, diminution of the fat-splitting process is not diagnostic of pancreatic disease. Hecht reports a simple method of determining a fat in the feces. The stool is first saponified with alcoholic caustic soda, hydrochloric acid is added, the alcohol evaporated, and the fatty acid extracted with ether.

Bondi and Rudinger have conducted observations regarding the metabolism of fats and carbohydrates in diabetes. The facts already established, that acetonuria in diabetes can be diminished by giving a more liberal carbohydrate diet, and that a high glycosuria may be lowered by increasing the fats, have been the basis of their experiments. They present several tables showing the influence of variations in the diet upon the sugar and acetone output, and from a comparison of these they conclude that when a certain ratio is established between the ingested fat and carbohydrates there is a considerable diminution both in the amount of acetone and of sugar in the urine, provided, however, that the case of diabetes is not of the very severe grade, and that the amount of carbohydrate given is not excessive. For explanation of these facts they incline toward the theory advanced by Gellmuden, that in the normal body the fats enter into definite chemical combination with the carbohydrates (or their derivatives), forming a third substance, which enters into the body metabolism.

Cabot points out the fallacies in the usual routine efforts to increase and decrease weight, and states that it is not as simple as the loading and unloading of a vessel. Our state of nutrition depends upon the number, the contents and the activities of our body cells.

The chief factors in nutrition are: (1) Ingestion of food, in quantity and quality suited to individual needs; (2) utilization of food, digestion, absorption, metabolism and excretion; (3) cell growth as influenced by age, sexual factors, internal secretions, sleep and other forms of rest, exercise and other forms of activity, hereditary, individual and psychic factors. He discussed each of these factors, and concludes that loss of weight is often observed as a part of the aging process in persons past middle left; that this emaciation is often associated with arteriosclerosis, possibly as a result of it, possibly as the concomitant effect of some third factor.

The rapid gain in weight often seen in growing children and in the convalescence from wasting disease is not directly a result of abundant food, and may occur even when the food supply is far below normal. The gain must be referred to an extraordinary rapid cell production, primarily to heightened growth-energy in the cells themselves. Influ-

ences connected with the organs of sex may exert a controlling force on nutrition, as is strongly suggested by the changes in flesh and figure following parturition and menopause. The importance of internal secretions in the maintenance of perversion of nutrition is exemplified in the emaciation of Graves' disease, the increased weight of the myxedematous and perhaps in the more local hypertrophies of acromegaly and Paget's disease. The possibly decisive influence of insomnia on weight is suggested by the rapid emaciation sometimes occurring in cases of aneurism, when sleep is prevented by pain, though appetite remains excellent. Petitti, following up the work of Orłowski, who used glucose only in his experiments, endeavored to determine the degree of consumption of the various kinds of sugar uninfluenced by the liver. In order to accomplish this, the rectum was tamponed high up, and sugar solutions were introduced into the lower part of the rectum. These experiments were carried out upon diabetics as well as upon healthy individuals. The author found that sugar was absorbed as such in the rectum, without any marked degree of bacteritic decomposition taking place. It could not be said that the sugar was utilized any better per rectum than per os. At times the one was more complete, and at times the other. It is not possible to say what influences bring about the variation. In diabetics, the amount of dextrose excreted was always increased through the ingestion or injection of sugar, and this regardless of the kind of sugar used. The author is not prepared to say which sugar is best utilized by the diabetic. It seems, however, to be the milk of sugar. In severe cases of diabetes neither the existing acidosis nor the amount of sugar seemed to be in any way influenced by the introduction of sugar per os or per rectum. Sugar enemata, especially the milk sugar, have a place in the diet of the diabetic. Salus presents an exceedingly interesting article concerning diabetes and glycosuria and their relations to pregnancy, heredity, parcosis, etc. This article is accompanied by literature reference which greatly enhance its value.

The X-Ray as a diagnostic aid in internal medicine is becoming more and more popular. That it is a most valuable aid cannot longer be questioned. Stones in the kidneys, ureters and bladder are shown by the radiograph with marked precision. The work of Holzkecht on radiologic diagnosis in connection with gastrointestinal diseases is especially noteworthy. In early involvement of the lungs, too, much may be learned through the application of the rays. Schuele points out the sources of error in the ordinary methods of determining the position of the stomach, and endeavors to show that, after all, the radiograph affords us the most exact method. In carrying out these observations, the stomach was first outlined by the percussion-auscultation method; wires were fastened on the abdomen along these lines, the patient was then given a meal containing a large quantity of bismuth and a radiograph taken. In some cases the

two outlines corresponded, but in others there were great discrepancies. All in all, however, the author finds that the percussion of the full stomach in the standing position is fairly reliable. He points out the importance of using the radiograph with the patient in the standing position. In the inflation of the stomach, one of the chief sources of error is the position of the transverse colon and its relations to the stomach, sometimes lying in front of the stomach and at other times just below it. In either case, if the colon is inflated with gas, the percussion note over the stomach and colon will be identically the same.

Adam finds that in all cases in which physical examination showed difference in percussion note, or changes of breathing, etc., more or less diffuse or circumscribed shadows were demonstrated by the X-Ray. This was also present in cases in which catarrhal symptoms were found on physical examination and also in some cases in which the physical findings were negative entirely. He concludes that in those cases in which there is infiltration, the conditions were discovered earlier with the X-Ray than by means of physical examination. The second lot of cases in which there was a chronic infiltrating process without catarrhal symptoms, the diagnosis could be made earlier by X-Ray than by physical examination. Adam concedes it would take more observations to determine by X-Ray the kind of pathological process present.

Cannon finds that the most characteristic feature of the movements of the alimentary canal is undoubtedly their rhythmicity. Peristaltic waves pass in rhythmic succession over the stomach. In the small intestine the most usual activity is a rhythmic segmentation of the food. In the ascending colon, antiperistaltic waves rhythmically follow one another toward the caecum. The author has listened carefully and attentively to the abdominal sounds for long periods of time, and believes that it is possible to differentiate between the sounds produced by the stomach, small intestine and large intestine. By means of a telephone transmitter placed over the abdomen and activating through an induction coil, a nerve muscle preparation, he has secured graphic records of the sounds made by the stomach and small intestine wholly without the mediation of human judgment. The stomach-sounds are best heard about an hour after a bountiful meal, with the patient lying on his back and left side, and the stethoscope placed near the end of the eighth rib and on the right side. The sounds heard here are loud, rattling, explosive and of characteristic quality. The rate of their recurrence varies from every seventeen to twenty-four seconds. The rhythmic sounds of the small intestines are very different from those of the stomach, being soft, muffled and sometimes a group of little rattling, explosive discharges. Each sound lasts two or three seconds or more, and the rhythm is persistent for some time in one place, occurring every seven to eight seconds. The sounds of the large intestine are noticed best in the right lower quadrant

of the abdomen, are characterized by a succession of little popping noises and faint gurgling. These sounds indicate that the ascending and first part of the transverse colon are more active than the remainder of the large intestine. The sounds start in the transverse colon and their advance can be clearly traced. The sounds can be heard first faintly, then louder and louder, then gradually more faintly again. If the stethoscope is changed to a position farther along the small intestine, the sounds can be again heard passing through the same phases as before. Whether the observation of the sounds of the stomach and intestines is to be of clinical importance will depend upon whether or not there are typical variations in different diseases of the alimentary tract. The author suggests that the method might be used to separate the somewhat vague expression, motile insufficiency, into its two factors, absence of peristalsis and pyloric obstruction.

It is interesting to note the rapid multiplication of reports of congenital hypertrophic stenosis of the pylorus during the past year. Until a year or two ago practically all the cases that had been reported, with few exceptions, occurred in Germany, France and England. Now, that the symptom complex has been so definitely pictured, cases are being recognized in considerable numbers in America. Rob recites such a case with recovery through medical treatment. The author reviews the literature and lays stress upon the fact that from 80 to 85 per cent of all cases occur in male children. Fisk, Fischer, Putnam, Block and others have reported cases.

Kast gives Head's theories regarding the superficial sensitive zones of the skin accompanying diseases of intestinal organs, reviews the investigations of other men regarding them (Muller, Willoughby, Scherren, Lenander and others), and reports his investigation on three hundred cases, in two hundred of which he has positive information (gastritis acidica 42, carcinoma of the esophagus 5, carcinoma of stomach 12, stomach ulcer 26, appendicitis 6, acute and subacute cholecystitis 6, and the remainder made up of combined conditions, such as chronic intestinal catarrh, heart and lung disease, anemia, arteriosclerosis, etc.). He concludes from these investigations (1) that zones described by Head do occur; (2) however, that they are very inconstant; (3) that they depend not seldom upon the individual sensibility, and are compared to local "neurasthenia;" (4) that the cause of perceptions of the stimulus of internal organs is yet indefinite. He advances the idea that the oft-repeated muscular contractions may cause local anemia, or by repetition of impulses, fatigue of muscles or ganglia and thereby produce these perceptions; (5) a zone may have different forms of stimuli for its production and a differentiation is not possible for a diagnosis; (6) the zone for ulcer of the stomach is very frequently found in nervous, anemic and poorly nourished patients in whom the pain is severe. But he also found

them entirely absent even in these individuals, and one can draw no conclusions from their absence; also, that it does not place the location of the ulcer; (7) that they are frequently found present in cholelithiasis and appendicitis, but these, especially appendicitis, occur with other conditions, iliocecal and iliocolic diseases, spasm of the colon, etc.; (8) they do not differentiate the conditions of one region; (9) a diagnosis of the stage of the disease cannot be made from them; (10) they are of no value in differentiating conditions of one region from another, sometimes when the other symptoms may be common to both; (11) no conclusions as to the pathological conditions can be drawn from them.

Battle, under the head of "Acute Abdomen," reviews in a very interesting manner various abdominal conditions, which are apt to be met with and require immediate attention upon the part of the physician. In this connection he discusses appendicitis, ulcer of the stomach, perforations of duodenal ulcer, ulcer of the jejunum, perforations in typhoid fever, stercoral ulcers, intestinal obstruction, volvulus Meckel's diverticulum. The difficulties that confronts a physician in cases of this sort are at best, trying. The diagnosis must depend rather upon the clinical signs and the history of the case, rather than upon the physical examination. This article gives to one an excellent idea of the train of symptoms in these conditions.

The employment of the various diagnostic methods of determining the renal sufficiency is rapidly seeking its proper level. The consensus of opinion among those who have given much thought to the subject, Kövesi, Lichtenstern and other, is that no one method may be relied upon absolutely, but that the various methods, viz., cryoscopy, phlorhydric, methylene blue, etc., must be employed and conclusions drawn from a comparison of results, and that, above all, the ordinary examination of the urine and the clinical manifestations must always be taken into consideration. Cabot urges the importance of determining the sufficiency of the kidneys in diseases of that organ through a careful observation of symptoms, characteristics of the urine, evidences of uremia, dropsy, cardiac involvement, etc., rather than to depend entirely upon the finding of albumen and casts. These, alone, do not permit of a diagnosis of nephritis. He recommends, especially, the dilution tests, the concentration test, and the capacity of the kidneys to excrete certain substances. He finds that in the early stages, for instance, of acute renal insufficiency, the kidney loses the power to secrete a dilute urine, while, on the other hand, in cases of chronic interstitial nephritis, the kidney continues to secrete a concentrated urine, even though the water is restricted. Neudorfer recommends highly the employment of cryoscopy in the determination of the functioning powers of the kidney. Kummel was one of the first to point out its importance, and claims never to have had a mishap in the 160 cases of nephrectomy in which he employed this test,

Neudorfer reviews the technique of the procedure and recommends some valuable points.

Dwight also believes that albumen in minute quantities is not only normally found in the urine, but is a normal constituent of the urine. Especially after severe exercise and mental strain it is constantly found in traces. Only when the albumen is accompanied by true renal casts may we say that it is of renal origin. Warfield, basing his conclusions upon a wide experience in insurance work, also believes that too much significance must not be attributed to the finding of casts, unless accompanied by physical manifestations of kidney disease. Basing his conclusions upon his own observations, as well as upon a careful review of the literature, he believes that hyaline casts have their origin from the cells of the kidney which undergo changes in the tubules, and that granular hyaline and waxy casts originate from the same source.

The Stokes-Adams syndrome has received much attention, and cases are now being reported from various sources. The condition is characterized by dizziness, bradycardia, high arterial tension, accentuation of the second aortic, and precordial anxiety. Cases have been described by Osler, Rist and others. The syndrome is supposed to be due to some form of degeneration of the auriculo-ventricular bundle of His. Grumbaum found in autopsy a gummatous growth in the interventricular septum involving this bundle. Jellick, Cooper and Ophuls found anemic necrosis of the septum due to thrombosis of the nutrient vessels near the bundle of His. Steiner reports three cases of Stokes-Adams disease with the typical symptom complex, namely, attacks of syncope bradycardia. In one case the pulse ranged from 37 to 19; in another about 40 a minute. Hay and Moore record a case of Stokes-Adams disease in its second stage, that of apileptiform or epileptiform diseases.

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DIAGNOSIS.

IN CHARGE OF

ALBERT E. TAUSSIG, M. D.

Physical Diagnosis—After all these years of careful work and prolific writing it would seem that the last word must have been said concerning methods of outlining the area of cardiac dulness. The routine use of the x-ray has, however, demonstrated that the usual methods of percussion give us information as to the pulmonary boundaries, but not at all as to the true dimensions of the heart. It was not until Goldscheider last year, elaborating an old suggestion of Turban, described his method of orthopercussion that a method was found by which the cardiac outlines obtained on percussion could be made to coincide with those of radiography. Goldscheider's method essentially is as follows: The percussion must be done so gently that in a quiet room the sound is only just audible to the ear held close to the percussion finger; only the tip of the plessimeter finger must be held against the chest; the percussion must be done only in the intercostal spaces not over the ribs; the direction of the blow as one passes around the chest must not be perpendicular to the thorax wall, but should always be kept sagittal, i. e., parallel with a line perpendicular to the sternum. This method, at first received rather coldly, has been extensively tested during the past year and has met with general commendation. Thus Treupel and Engels,¹ as the result of a large series of observations, concluded that orthopercussion surpasses all other known methods of determining the outlines of the heart by percussion and gives valuable information where other methods fail, as in advanced emphysema. They outlined the heart, first, by this method and then by the orthodiagraphic use of the X-Ray. The two results coincided remarkably. Curschmann² has had the same experience. He advises that the patient be examined in the recumbent posture and during shallow respiration. By this means an accurate outline not only of the heart but also of the great vessels can be obtained. Meyer and Milchner³ state that this method alone enables one accurately to outline the infantile heart. In children the throat is so elastic and resonant that the ordinary methods of percussion give very misleading results. It would seem, in brief, that orthopercussion really represents a notable advance in physical diagnosis. Its results are even more trustworthy than those obtained with the X-rays, unless the latter are used with all orthodiagraphic precautions.

Another useful method recently suggested by Goldscheider⁴ consists in comparing the results obtained on outlining the heart as the patient slowly rolls from the prone position until he lies on his left side. The force of gravity pulls the heart towards the left and brings it nearer to the chest wall so

that its left edge as found by percussion approaches the axillary line and the apex beat becomes more prominent. Both these changes will be exaggerated if the left ventricle be slightly enlarged and the blood pressure high. Goldscheider believes that in this way a beginning hypertrophy of the left ventricle, especially if due to arterio-sclerosis, can be made out earlier than by any other means at our disposal.

As regards both treatment and prognosis, the determination of the cardiac outlines must yield in importance to the measurement of the ability of the heart properly to do its work. Many attempts have been made to solve this problem, none with entire success. Gräupner⁵ suggests a new method. The systolic blood-pressure is first carefully measured with the patient at rest. He is then made to perform a moderate amount of work and the blood-pressure repeatedly measured at intervals of a few minutes. In health the pressure rises slowly and then quickly falls to normal. In moderately incompetent hearts the blood-pressure first rises sharply, then falls below normal, slowly to rise again. The greater the cardiac incompetency the more profound and enduring is the fall of pressure after exercise. Trustworthy results are however obtained only if the amount of exercise is very moderate. Gräupner suggests slow extension of both legs against a slight resistance, with the patient in a semi-recumbent posture.

Levy⁶ has been testing Katzenstein's method of determining the functional power of the heart. After determining the blood-pressure and pulse-rate of the reclining patient, both of the femoral arteries are compressed with the middle finger of each hand at Poupart's ligament, the other fingers testing whether the compression is absolute. With normal heart energy, the blood-pressure then rises from 5 to 15 mm. of mercury, while the pulse remains unaffected or is slowed. On relinquishing the compression, the blood pressure gradually returns to normal. In case of hypertrophy of the heart, aortic insufficiency, aortic sclerosis or nephritis, the blood-pressure rises much higher during the period of compression. A weak heart, on the other hand, is not able to raise the blood-pressure when the obstruction to the circulation is interposed, and with a much enfeebled heart the pressure may even sink below normal. In both of the last conditions the pulse is accelerated. Levy's researches have confirmed the great value of this means of determining the power of the heart. It is especially instructive in examining the heart after acute infectious diseases and in anatomic cardiac lesions. Its results are, however, not trustworthy in neurotic or very excitable patients. Here, as in all other similar methods, the most reliable results are obtained after the patient has grown accustomed to the necessary manipulation.

As the result of a considerable number of observations both pathologic and clinical, Saathoff⁷ comes to some interesting conclusions regarding aortic aneurism. This disease, when due to syphilis, has its beginning

in an endarteritis of the vasa vasorum. The resulting degeneration of the aortic wall causes the latter slowly to yield to the blood-pressure, thus producing a dilatation. This early stage of the disease can be well made out by the use of the fluoroscope and Saathoff urges the routine use of X-ray examinations in all cases of obscure thoracic disease. Where an X-ray apparatus is not at the disposal of the clinician, another sign is often useful. The beginning dilatation, if not situated too far from the heart, produces a widening of the aortic orifice and thereby all the signs and symptoms of aortic regurgitation. He considers this observation of the greatest importance and urges that every case of aortic insufficiency that cannot be explained as the result of arterio-sclerosis or of a rheumatic infection should be provisionally considered as one of beginning aortic aneurism. At this period a vigorous anti-syphilitic treatment may still result in a *restitutio ad integrum* and should never be omitted.

Some years ago, Garland, an American, pointed out that the upper boundary of the area of dullness, posteriorly, in pleuritic effusions was not usually a straight line, but that, between the spinal column and the area of dullness, a resonant triangle could be made out with its apex downwards and its base fusing with the tympanitic resonance above. This observation, "Garland's sign," has ordinarily been ignored by the textbooks. Krönig⁸ again calls attention to it and emphasizes its diagnostic importance. His experience, based upon nearly a thousand careful observations, has convinced him that this sign may serve to distinguish a pleuritic effusion from a pneumonia in obscure cases. The patient must of course, be examined in the erect posture. Pollak,⁹ on the other hand, points out that the same observation may often be made in cases of pneumonia where the process is localized near the spine and believes therefore that the sign has no diagnostic value. Such pneumonias, however, would ordinarily present a very different picture from pleuritic effusions and it would seem that in cases where a confusion is possible, Garland's sign, while not pathognomonic, may be of considerable value. In a long and interesting article Rieder¹⁰ points out that there is no method by which so accurate a knowledge of the actual condition of the lung in pneumonia can be obtained as by means of the X-ray. He places a piece of ground glass in front of the fluorescent screen and by means of a paraffine pencil draws on the glass the outline of the pneumonia shadow in the darkened room. The location of the pneumonic area can be accurately made out a day or more before auscultation or percussion gives trustworthy data, the course of the disease can be exactly observed from day to day, fresh foci can be detected at once and finally the important prognostic observation can occasionally be made that pneumonias which apparently end in complete resolution, leave behind them some atelectasis or peri-bronchial thickening. Unfortunately the nature of the required apparatus will for some time to come confine the use of this important diagnostic agent to well-equipped hospitals.

The apparently erratic presence or absence of increased vocal fremitus in pneumonia has caused this sign to seem of comparatively slight diagnostic importance in pulmonary infiltration. Arneth,¹¹ however, as the result of a study of 117 cases of pneumonia in the last few years is lead to believe that the value of vocal tactile fremitus has been underestimated. He finds that with great regularity it is markedly increased in the first and third stage of pneumonia, whereas in the second stage, that of hepatisation, it is usually diminished. He explains this observation by the consideration that during the period of congestion as well as during that of resolution the alveolar tissue is relaxed and therefore transmits the coarser vibrations, which alone can be felt, better than does the lung when distended either normally by air or pathologically by a pneumonic exudate. The vocal resonance is marked in the latter condition because the solid lung transmits well the higher pitched vibrations that are audible but not palpable. If correct, this observation would enable one to distinguish the stage of the disease even when the testimony of auscultation and percussion is dubious. Moreover, a beginning resolution will show itself in an increased vocal fremitus earlier than by a change in the auscultatory signs and an increased fremitus at one edge of the consolidated area would indicate that resolution was beginning there. The exception to the rule is where the amount of pneumonic exudate is slight. Here there will be increased tactile fremitus throughout the disease. Kephallinos¹² believes that Westphal's sign may be of value in the diagnosis of pneumonia, especially in children. The knee jerk was abolished in 49.2 per cent of 65 children with lobar pneumonia, in some cases at a time when the thoracic signs were still dubious. It usually returned promptly with the crisis.

The early diagnosis of pulmonary tuberculosis is of such pre-eminent importance that it occupies the attention of many observers and a considerable literature on the subject appears every year. The careful percussion of the pulmonary apices is clearly indispensable. Minor¹³ has come to some interesting conclusions, based on the marking of the apical outlines in all of his cases during the past six years. He finds that the inner border of the diseased apex is affected earliest, being dislocated outward. The dislocation inward of the outer border usually occurs later. In the earliest cases these two lines do not join at an angle, but run across the shoulder to meet their fellows from the rear. Later, when fibroid shrinkage has set in they often run together to an apex before they reach the border of the trapezius. When considered in connection with the auscultatory and other findings, Minor believes these observations to have great diagnostic and prognostic importance. The significance of a rise in temperature just before the menstrual period is still a matter of dispute. Riebold¹⁴ believes that a diseased condition anywhere in the body may be responsible for this phenomenon. Where, however, no definite lesion can be made out, and in particular where the pelvic viscera are normal,

a premenstrual fever will usually point to a latent tuberculosis. The rise in temperature is best measured per rectum.

The diagnostic utilization of X-rays in diseases of the digestive tract, while less promising than in cardiac or pulmonary affections, is being developed by a number of observers. Thus Cahn¹⁶ reports a number of cases of esophageal disease beautifully demonstrated by means of the fluoroscope. The patients are made to eat thick rice porridge mixed with bismuth subnitrate and are then examined radioscopically. In cases of esophageal stricture, for instance, the esophagus above the stricture can be seen slowly to fill with the opaque masses while below it, unless entirely impermeable, a thin band of food slowly descends to the stomach. Diverticula, dilatations, paralysis of the esophagus can be made out with equal ease. The X-rays are made to penetrate the throat from side to side to avoid the interference of the opaque spinal column. Holzknecht,¹⁷ who has done more perhaps than any other in the radioscopy of the stomach, is an enthusiastic advocate of this method of gastric diagnosis. The patient is made to swallow a suspension of bismuth in water and the gastric region carefully observed with the fluoroscope. The gastric peristalsis can be clearly seen and abnormalities noted. A muscular insufficiency in the pyloric region, the so-called antrum pylori, is very suggestive of cancer. If the tumor is large and projects into the gastric lumen, it becomes visible as an indentation in the bismuth shadow. Conversely tumors supposed to be gastric, if seen to be disconnected from the gastric shadow, may be proven not to involve the stomach. An otherwise impalpable tumor or foreign body if made out by means of the fluoroscope can sometimes, thereupon, be felt since the attention of the observer is directed exactly to the proper spot. Schütz's results confirm Holzknecht's. In particular, the former believes that when the antrum pylori is poorly filled by means of the bismuth suspension or shows a diminished peristaltic activity, a gastric cancer should always be suspected.

It happens entirely too often that practitioners rest content with the diagnosis of cholelithiasis. It is clear, however, that this diagnosis is insufficient, and that it is often essential, for the inauguration of the proper therapeutic measures, to establish more accurately the location of the stone. Ehret¹⁸ believes that it is often possible to make out with certainty the presence of a stone in the common duct. The presence of three cardinal symptoms, he believes, will always enable us to do this. The first consists in the presence of periodic attacks of fever, the elevation of temperature usually being considerable, in one case reaching nearly 106°. In the second place, these febrile attacks are usually accompanied by icterus, or where there is a chronic jaundice, by an increase in its intensity. Thirdly, the characteristic pain of gallstones is absent, although there may be considerable hepatic tenderness. A choledochus stone may be present without producing all of these symptoms, but whenever all three

are found, such a stone may be diagnosed with certainty. In the seventeen cases in which this symptom complex occurred in his practice, he never failed to find a stone in the common duct. He cites one interesting case of this sort in which a large stone was found in the adhesion between gall-bladder and intestine. The adhesions all about this region were so extensive as to make further dissection very undesirable. On account of the presence of the three symptoms, however, he insisted on a further search, and was rewarded by the finding of a great solitary calculus in the common duct. Moynihan,²⁰ while recognizing the general truth of Courvoisier's law, that in chronic icterus the presence of a large, tense gall-bladder indicates carcinoma, while a small, not palpable one speaks for stone, points out the possibility of exceptions to the rule. When a stone in the cystic duct causes hydrops or empyema of the gall-bladder, or where one in the common duct is accompanied by an acute cholecystitis, we may have a palpable gall-bladder. On the other hand, a cancer of the common duct or of the head of the pancreas may be accompanied by an obliterating cholecystitis and result in a shrunken, impalpable gall-bladder.

In abscess of the liver, the determination of the site of the pus collection is second in importance only to the diagnosis of hepatic abscess itself. Gabbi²¹ points out that in general the intensity of the pain is proportional not to the size of the abscess, but to its nearness to the surface. In one case in which the abscess was near the capsule, the pain was so intense as to require morphine, and yet the abscess was a very small one. In another, to be sure, the pain was severe and paroxysmal, and yet the abscess was deep. Here the pain must have been due to the rapid distension of the capsule. Usually, however, the rule holds good. When the pain is in the scapular region, the abscess may be expected in the convexity of the liver; when it is in the lumbar or intercostal region, the pus will be found near the under surface. Even when the liver is very hard, the abscess may be near the anterior surface. This condition is found in alcoholics with indurated livers. The history, as well as the objective findings, is evidently of great diagnostic importance.

While not at all an opponent of operation in appendicitis, Hawkins²² believes that the appendix is at present removed far too frequently. Every severe pain in the ileo-cæcal region is called appendicitis and leads to operation. Many of these patients, however, are not at all relieved by the appendectomy, simply because the pain was due not to appendicitis, but to an entirely different cause. Intestinal neuroses and even mucous colitis may, though rarely, be mistaken for appendicitis. A more frequent source of error in the presence of a true entero-spasm. This may involve any portion of the intestine, but has its usual seat about the beginning or the end of the colon. The pain may be severe and long continued, and is usually referred to the right or left iliac fossa. In the former case a false

diagnosis of appendicitis may readily be made and may lead to unnecessary operation. He reports a number of such cases in which the enterospasm was actually seen when the abdomen was opened. Such patients are usually neurasthenics, and the site of the pain is apt to vary from time to time. In these patients, especially in the absence of fever and leucocytosis, the diagnosis of appendicitis should be made with caution. Armstrong²⁸ describes a condition which he calls appendicitis pelvica. Here the exudate is situated just above or below the pelvic inlet, and it is chiefly the pelvic peritoneum that is affected. These cases are often overlooked, since there is tenderness neither at McBurney's point nor at any other spot accessible from above. A bimanual rectal examination alone can throw light upon the condition and make possible an early diagnosis. It should therefore never be omitted in obscure abdominal affections. The mortality in these cases is, at present, very high, since they are usually diagnosed too late. At the operation, Trendelenburg's position is advised.

The interpretation of pain supposed to be of renal origin is often a matter of much difficulty. Hutchins²⁴ suggests, as an aid to diagnosis, the injection of some bland fluid through the ureter into the pelvis of the painful kidney. Even in health, the dilatation of the renal pelvis by this means is accompanied by pain, but intelligent patients are usually able to tell whether the pain so produced closely resembles the pain from which they suffer or not. In the former case the presence of some condition leading to permanent or intermittent dilatation of the pelvis may be inferred. In only three of the 100 cases so tested was the information obtained entirely misleading. He describes an instrument whereby the amount of pelvic dilatation may be measured. The procedure itself, under aseptic precautions, seems to be free from danger. Voelcker and Lichtenberg²⁵ have used a similar maneuver in connection with the X-rays. A ureteral catheter is pushed up into the pelvis of the kidney and a warm 5 per cent. solution of collargol injected. An X-ray photograph is then taken. Dilation of the ureter or of the renal pelvis, dislocation of the kidney, ureteral kinks and the like can readily be made out on the plate. Aside from an occasional dull ache, lasting a few hours, the patients experienced no inconvenience. In properly selected cases the method may have some value. In nephrolithiasis, on the other hand, the use of the X-ray has become indispensable and today no operation for this disease is justified if a careful radiographic examination by an expert gives negative results. Holland²⁶ sums up the present status of the matter as follows: 1. When a stone or stones are present in such size as to produce symptoms suggesting the desirability of operation, if a careful and thorough examination is made, such stone or stones can nearly always be shown by X-rays. And this would also apply to the presence of stone even if the symptoms alone were not sufficient to demand operation. 2. In most cases when shadows

are shown, the size, shape and position can be relied on in diagnosing them as from kidney or ureteral stones. In other cases, when doubt may arise as to the cause of the shadows, the experience of the examiner will often settle the matter and in some cases stereoscopic radiography, the use of ureteral bougies, etc., can be used as a help. 3. The negative diagnosis can be relied on only when the whole region on both sides is carefully examined and when the plates are taken under the essential condition for successful examination and when they are of the necessary quality in showing sufficient differentiation of the soft structures in the kidney and ureteral regions. 4. There can be no justification for operation or prolonged medical treatment without an efficient X-ray examination being made.

A means of diagnosis, that is apparently not receiving due recognition, consists in the auscultation of the spine, sacrum and pelvis. Crepitation over these bones, audible with the stethoscope, will, according to Ludloff,²⁷ occasionally aid in clearing up an obscure diagnosis. Where elderly women complain of sacral pain and where inspection and palpation as well as a gynecologic examination are negative, auscultation over the junction of sacrum and spine may reveal a grinding and cracking sound on change of posture. Radioscopy will then show the presence of an arthritic deposit at this point, and proper orthopedic treatment will give relief, when all other measures have failed. If the deposit is at the point of emergence of the sciatic nerve, an intractable sciatica will result, whereas in the upper cervical region, occipital neuralgia may follow. In both conditions careful auscultation of pelvis or vertebral column will often throw light upon the nature of the lesion. In traumatic cases the results are even more striking. He quotes a case in which, after fracture of the clavicle, the patient's other pains were ascribed to hysteria or simulation. For eight years she was unable to obtain relief, until finally auscultation revealed a creaking over the seventh cervical vertebra. A radiogram revealed a fracture of this vertebra, which had evidently occurred when the clavicle was broken. Koplik²⁸ advocates percussion of the skull in suspected hydrocephalus, whether due to acute cerebrospinal meningitis or to the onset of a tuberculous meningitis. When the lateral ventricles are distended with fluid the percussion note obtained over the region of the lateral ventricles will have a tympanic, sometimes almost a musical note. The exact location of the area of greatest resonance will vary somewhat with the position of the head. In these cases of acute hydrocephalus, prompt lumbar puncture is often a life-saving operation. Koplik believes that percussion of the skull alone gives trustworthy information as to the presence of an acute increase of fluid in the lateral ventricles or in the subarachnoid space.

Blood.—Of all the many blood-stains, the one now in greatest favor for routine work consists in the use of a methyl-alcoholic solution of

eosinate of methylen blue with or without the addition of some form of methylen azur. A multitude of new stains are constantly being advocated, but as a rule they are merely modifications of the above and do not represent any real improvement. May²⁹ has suggested a method that has at least the advantage of simplicity. The blood spread is stained according to Jenner, then placed for one minute in distilled water. Without drying the specimen, one drop of a 0.5 per cent aqueous solution of methylen azur is added and the preparation rocked a little to insure an equal distribution of the stain. In two to four minutes the spread is dried and is ready for examination. The method is said to give clear and brilliant pictures free from precipitate. Viereck,³⁰ however, contends that the method fails to give an adequate stain of the chromatin in tertian and quartan malarías, and that the preparations do not keep well. It seems to offer no advantage over the satisfactory Wright's stain. Assmann³¹ suggests the following modification: The unfixed spread is placed on a slide in a Petri dish and covered with forty drops of Jenner's stain. After three minutes, 20 c.c. of distilled water, to which five drops of a 0.1 per cent solution of potassium carbonate has been added, are poured over the specimen and the dish rocked until the stain has been washed off. Five minutes later, the specimen is removed from the wash-water, dried and examined. Sections are treated similarly, only that the potassium carbonate is replaced by an equal amount of acetic acid. The method is said to give excellent results.

The leucocyte count has won for itself a well-recognized place in surgical diagnosis. The differential leucocyte count is not yet as generally used as its value warrants. Gibson³² believes that the differential count and its relation to the total leucocytosis is at present the most valuable diagnostic and prognostic aid in acute surgical diseases that is furnished by any of the methods of blood examination. Its chief value lies in enabling us to recognize the existence of suppuration or gangrene as shown by an increase in the relative percentage of polymorphonuclear neutrophil cells out of all proportion to the total leucocytosis. The greater the disproportion the more sure are the findings and in extreme disproportions, the method in his hands has shown itself practically infallible. A negative finding, in which the relative increase in the neutrophil cells is not marked, is of much less value, but suffices to render the existence of a severe suppuration improbable. The attempt to utilize blood examinations in the diagnosis of obscure affections of the digestive tract, in particular for the differentiation of carcinoma from ulcer or beginning pernicious anemia, has, as Ewald³³ points out, practically ended in failure. Even the absence of a digestive leucocytosis is of little diagnostic value for gastric cancer. In advanced cases of the latter, the results of blood examination are fairly constant, but here the results of the method are not needed for diagnosis. In suspected trichinosis, on the other hand,

the presence of an eosinophilia is of great diagnostic value. In seven cases, Stäubli³⁴ has found it constantly present. The eosinophilia begins to show itself some nine days after the infection takes place, and is coincident with the migration of the embryos into the blood current. It is probably due to a reaction on the part of the organism to substances taken up by the blood from the degenerated muscle substance or perhaps from the embryos themselves. He believes that a rapid destruction of the lymphocytes as shown by a relative decrease in their numbers, is a bad sign, prognostically. In the four cases that terminated fatally he noted the presence of Kernig's sign and an absence of knee jerks. In all of his cases, the urine showed a well-marked diazo-reaction. As regards the eosinophilia, it may be observed that in order to be significant, it must be somewhat persistent. In a case recently observed by the writer of this abstract, trichinosis was suspected and a marked eosinophilia was observed. The latter, however, disappeared after a few days, and further observation of the case rendered the diagnosis of trichinosis improbable.

Given³⁵ has made some interesting observations on the blood in pregnancy. During the last months a slight leucocytosis, involving chiefly the polymorphonuclear elements, is constant. It becomes very marked during labor and then rapidly disappears. During the period of uterine involution, an outspoken lymphocytosis makes its appearance. The more rapid the process of involution, the more marked the lymphocytosis, so that this symptom seems to have considerable prognostic value in determining the prospect of a prompt recovery of the patient.

Stomach Contents and Stool.—Animal experiments, especially with Pawlow's methods, show, beyond question, that the secretion of the gastric juice is dependent upon two groups of factors. In the first place, the sight of food as well as the tasting and chewing it, brings about a marked gastric secretion; secondly, the food itself, after it reaches the stomach, stimulates the mucosa reflexly or directly to further production of HCl and ferments. Kast³⁶ has succeeded, by means of experiments upon himself and upon a patient with a gastric fistula, in showing that the same rules hold true in man. It follows that in interpreting the results of an analysis of a recovered test-meal, the physical circumstances affecting the patient must be well considered. If the patient is very hungry, the test-meal appetizing, the time spent in chewing and enjoying the meal excessive, the psychical element influencing the gastric secretion will be correspondingly great. On the other hand, dread of the stomach tube, an unappetizing test-meal, unpleasant surroundings while the meal is being eaten, may not only bring about an absence of the psychical stimuli of secretion, but may actually tend to inhibit that portion of the secretion dependent upon intra-gastric stimuli. The routine analysis of gastric contents, without regard to the above factors, may well lead to false conclusions. Dörner³⁷ calls attention to the fact that the use of Ewald's test-

meal alone is occasionally misleading. A stomach may be able perfectly to care for tea and toast, and yet fail in digesting a heavier meal. The most certain results are obtained by the analysis of the stomach contents first after a test breakfast and upon a subsequent day after a test dinner. If, for external reasons, only one analysis is to be made, the test dinner should be given the preference. In achylia gastrica, alone, the findings after an Ewald breakfast are more decisive than after a test dinner. Einhorn⁸⁸ attempts to test the digestive power of the gastrointestinal tract in an ingenious manner. He draws bits of solid foodstuffs through the openings of glass or porcelain beads, ties them in, and has the patient swallow them. The beads are then recovered in the feces, and an examination readily shows whether the food attached to them has been digested. Beads similarly loaded, attached to a thread, can be swallowed and withdrawn after a suitable interval, thus testing the digestive power of the stomach without the use of the tube. The healthy stomach should digest completely catgut and fishbones. If the intestinal functions are normal, raw meat, boiled potato and mutton fat should be completely digested and absorbed. If these substances are still found attached to their beads in the stool, a disturbance of intestinal function may be inferred. The disappearance from its bead of raw thymus is a good test for intact intestinal and pancreatic secretion. Simon⁸⁹ suggests a new test for free hydrochloric acid in stomach contents. A trace of pure gum-guaiac is dissolved in alcohol containing 20 per cent. spirit. ether. nitros. and is carefully poured over some of the filtered stomach contents in a test tube. A white ring of precipitated guaiac forms at the zone of contact and quickly turns blue in the presence of free HCl. The free acid liberates nitrous acid from the spirits of nitre, the latter oxidizes the guaiac and a blue color results. Organic acids may also give a positive reaction, but only in concentrations, such as are never found in the stomach's contents. Connective tissue, as is well known, is digested only in the stomach, and there only in the presence of hydrochloric acid. Hess⁹⁰ recommends that, in cases where the use of the stomach tube is undesirable, the patient be given some very rare chopped beef. If, on inspecting the stool, connective tissue fragments are found, a lack of hydrochloric acid in the stomach may be assumed.

Ziegler⁹¹ maintains that the earliest and most certain sign of gastric cancer is the presence in the stomach of minute remnants of food at a time when the viscus should normally be empty. Even where the motor functions of the stomach are macroscopically normal, the presence in the fasting stomach of these minute food fragments suggest cancer. In these cases lactic acid bacilli are nearly always present and persist in spite of repeated lavage. Where both of these symptoms are present, persistent microscopic retention of food and persistent lactic acid bacilli, the diagnosis of cancer is nearly certain. In non-malignant cases the stagna-

tion is either macroscopic or entirely absent. The lactic acid bacilli in these cases are also readily removed from the stomach by repeated lavage.

The most interesting of the newer gastric tests is unquestionably Sahli's desmoid reaction. A little methylen blue, salol or iodoform is wrapped in a tiny square of rubber tissue folded so as to form a bag, the opening of which is securely tied by means of catgut. As the latter, according to Sahli, is readily digested by the normal gastric juice, but not in the intestines, the appearance in the urine of methylen blue, salicylic acid or iodine speaks for an adequate gastric digestion. Their failure to appear, speaks for absence of hydrochloric acid. This method has been tested during the past year, with very diverse results. Kaliski⁴² expresses himself most enthusiastically. His experiences with patients and with healthy individuals leads him to conclude that the test gives very accurate results. When the examination of the urine is positive in from four to seven hours, hyperacidity is present; if in from seven to twelve hours, the gastric secretion is normal; if not until the second day, there is subacidity or motor insufficiency. The test was also found entirely reliable by Kuhn.⁴³ In fifty-four cases, it invariably proved an accurate and delicate criterion of the presence of free hydrochloric acid in the stomach contents. His cancer cases, as well as those of achylia gastrica, always gave a negative result. Horwitz⁴⁴ prefers the use of the stomach tube, but states that in his experience the desmoid reaction gave trustworthy results when for any reason the use of tube was contraindicated. He, as well as Holzknecht,⁴⁵ prefer the combination of Sahli's method with radioscopy. The little bag is filled with bismuth subnitrate and the patient's stomach observed from time to time by means of the fluoroscope. The little bag is then visible as a round black spot in the lowest portion of the stomach. When the catgut is dissolved, the bismuth escapes and, instead of a black spot, produces a diffuse shadow throughout the stomach. If this occurs within an hour and a half, extreme hyperacidity is present; if in two hours, there is moderate hyperacidity; if in two and a half hours, the gastric juice is normal, and a longer period of time indicates subacidity. If the bag leaves the stomach unopened, there is complete anacidity. Of course, these numbers are not to be taken too literally. Alexander and Schlesinger⁴⁶ come to very different conclusions. They believe the test to be worthless, because, in their experience, the little bag sometimes passes through the stomach unopened in spite of the presence of normal gastric juice, and on the other hand, because the catgut thread is sometimes digested in the intestine. Saito⁴⁶ found that, in vitro, a mixture of pancreatic and intestinal secretion was able to digest catgut threads, and Einhorn⁴⁷ showed, by means of his bead method, that catgut may be digested in the intestine. In a reply to various criticisms, Sahli⁴⁸ maintains the efficacy of his method, claiming that the reason for poor results lies in a failure to carry out in detail the instructions given by

him in his original communication.⁴⁰ The rubber tissue must be of a definite thickness and quality, the catgut must be of the proper sort and tied in a certain manner, etc. While these diverse results do not, as yet, permit a definite judgment upon the desmoid test, it does seem at present that the more carefully Sahli's directions are carried out, the more trustworthy are the results.

In the examination of the feces, the test of greatest importance is that for occult bleeding. The finding of traces of blood, too small to be recognized by ordinary means, is often indispensable for the diagnosis of obscure cases of gastric cancer or ulcer. Boas⁵⁰ recommends the test given by v. Storch for the recognition of pasteurized milk. The stool is rubbed up with twenty drops of glacial acetic acid and extracted with ether. To this extract are added one or two drops of a 1:200 solution of p-phenylenediaminchloride. Upon the addition of one c.c. of a half-normal alcoholic solution of potassium hydrate and ten to fifteen drops of 3 per cent hydrogen peroxide, an olive-green color soon changing to violet is formed at the bottom of the test tube in the presence of traces of blood. The test is also applicable to stomach contents. Schumm and Westphal⁵¹ advocate the following method: The stool is first extracted with alcohol and ether aa., the residue rubbed up with glacial acetic acid, treated with absolute ether, the extract washed with water and mixed with a little fresh alcoholic solution of benzidin (Merck) and an equal amount of hydrogen peroxide. A blue color indicates the presence of blood. Schlesinger and Holst,⁵² however, point out that this somewhat elaborate method is far too delicate for clinical use. Not only will a little red meat in the food cause a positive reaction in the stool, but a meat diet may still simulate an occult bleeding more than a week after the patient has been put on a meat-free regimen. They have modified the test so as to make it simpler and less delicate. A fragment of stool is stirred up with a little water, boiled for an instant and then added to a mixture of an acetic acid solution of benzidin with hydrogen peroxide. A blue color indicates blood. Even in this form the test is very delicate and requires, in order to be trustworthy, that the patient be on a meat-free diet.

Urine.—Cabot⁵³ again maintains the impossibility of determining the anatomic changes that have taken place in the kidney by means of urine examination, and urges that the attempt should be made to determine the functional power of the kidneys rather than the histologic changes. Albumen and casts alone never demonstrate the presence of a nephritis. The physical characteristics of the urine, the presence or absence of uremia, dropsy or cardiac involvement, together with the general course of the disease, give much more valuable information. The ability of the kidneys to secrete a dilute urine, after the profuse ingestion of liquids, gives valuable information as to renal sufficiency. Even this test, however, is not infallible. Tognetti⁵⁴ describes a modification of the tannic acid test

for albumen. Tannic acid, as is well known, is one of our most sensitive tests for albumen, but has not been applied to the urine, because it also precipitates other urinary constituents. His modification is said to obviate this difficulty. Equal parts of urine and of a 1.5 per cent alcoholic solution of tannin are mixed and heated and as much 33 per cent hydrochloric acid as was taken of urine and of tannin solution is added. An opacity indicates albumen, as other urinary constituents are not affected. Bile, if present, must first be removed. The test is extremely delicate, revealing one part of albumen in 200,000 of urine. Buchner⁵⁵ suggests a simple method of determining the percentage of albumen in the urine. Eight c.c. of clear filtered urine are boiled, a few drops of nitric acid are added (enough to render the mixture acid) and 2 c.c. of a saturated solution of salt. The whole is well shaken and poured into a graduate. The coagulated albumen promptly settles to the bottom and, after standing one hour, each c.c. of the sediment indicates one per thousand of albumen. If the precipitate is too lumpy, it must be stirred by means of a glass rod. If only an opalescence without precipitation occurs, there is present less than 0.1 per cent albumen. Comparative tests, he states, indicate that this method is surprisingly accurate. Krokiewicz's⁵⁶ reaction for bile pigments is extremely sensitive. Equal parts of sulphanilic acid and sodium nitrite solutions, each 1 per cent, are mixed in a test tube and all poured out except about 0.5 c.c. To this remainder a few drops of the suspected fluid (urine, stomach contents, etc.) are added. In the presence of bile the mixture turns red, and on the addition of a drop or two of hydrochloric acid, a permanent violet color results. None of the usual sources of error of bile tests apply, he states, to this method.

Bacteriology.—Gaetgens⁵⁷ describes a modification of the Widal reaction which may be useful for rapid work. The patient's serum is diluted with 100 parts of physiologic salt solution containing a suspension of typhoid bacilli and is centrifugated for ten minutes. At the bottom of the tube will always be found a small patch of sediment about which, if the test is positive, may be seen a number of tiny lumps of agglutinated bacteria. The tube is then well shaken. If the reaction is negative, a homogeneous opalescence results and microscopically only isolated bacilli are found. If positive, macroscopic lumps can often be seen after shaking, and under the microscope, clusters of ten or more bacilli will be found, more or less closely agglutinated. It seems probable that the same objections that apply to other rough and ready Widal methods will hold true for this one.

The earliest and certainly, if positive, the most trustworthy method of diagnosing typhoid fever consists in the cultivation of typhoid bacilli from the blood of the patient. The difficulty and complexity of the procedure has hitherto stood in the way of its general use. Conradi⁵⁸ has described a simplified method which makes it suitable for the general practitioner.

His culture medium consists of ox-gall, to which 10 per cent of peptone and 10 per cent of glycerine have been added, the mixture being contained in test tubes and sterilized. Eight to thirty drops of blood are withdrawn from the patient's ear directly into the tube, under the usual aseptic precautions. The tubes are placed in the incubator over night, whereupon the bacilli, if present in the blood, will have grown profusely. The contents of the tube may be poured over agar plates and the resulting colonies identified by the usual methods. The absolute identification of the bacilli meets with the usual difficulties, but for rough work the finding of typhoid-like bacilli suffices. As regards the rationale of the method, the bile inhibits the bactericidal power of the blood, the peptone aids in the growth of the typhoid bacilli, whereas the glycerine tends to prevent the multiplication of contaminating saprophytes. Keyser⁵⁹ has tested this method exhaustively and has found it thoroughly reliable. It is possible to demonstrate the presence of typhoid bacilli in the blood long before the Widal test becomes positive. Meyerstein⁶⁰ has found that ox-gall, which does not keep well, may be readily replaced by the crystallized bile salts, and Fornet⁶¹ states that it is not necessary to place the fresh blood directly into the culture medium. The patient's blood may be obtained at the bedside, allowed to clot, and this clot carried home and shaken up in a Conradi culture tube. In Germany these tubes may now be had of the dealers; it is to be hoped that before long some manufacturing firm may place them on the market here.

Among the useful books on clinical diagnosis that have appeared during the past year, the following may be mentioned:

- Caillé. *Differential Diagnosis and Treatment of Disease*. Appleton.
 Kilmer. *Physical Examination of Infants and Young Children*. Davis.
 Emerson. *Clinical Diagnosis*. Lippincott.
 Heitzman. *Urinary Analysis*. Wood.
 Kintzing. *Signs of Internal Disease*. Cleveland Press.
 Albers-Schönberg. *Die Röntgentechnik, Gräfe u. Sillner*. (Hamburg.)
 Oerum. *Methodik, etc.* Bergmann (Wiesbaden).
 Gaultier. *Précis de Coprologie*. Bailliére (Paris).
 Guiart. *Précis de Diagnostic*. Rudeval (Paris).

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3. Meyer and Milchner. *Berl. kl. W.*, Nos. 40, 41.
4. Goldscheider. *Deutsch. med. W.*, No. 41.
5. Graeupner. *Deutsch. med. W.*, No. 26. Interstate, p. 671.
6. Levy. *Zeitsch. f. klin. Med.*, Nos. 1, 2.
7. Saathoff. *Muench. med. W.*, No. 42.
8. Krönig. *Berl. kl. W.*, No. 13. Interstate, p. 476.
9. Pollak. *Wien. kl. W.*, No. 40.
10. Rieder. *Muench. med. W.*, Nos. 40, 41.

11. Arneth. Muench. med. W., Nos. 17, 18. Interstate, p. 601.
12. Kephallinos, Muench. med. W., No. 30.
13. Minor. Am. J'l. Med. Sc., Oct.
14. Landolfi. Sem. Med., No. 11.
15. Riebold. Deutsch. med. W., Nos. 11, 12.
16. Cahn. Muench. med. W., No. 2.
17. Holzknecht. Berl. kl. W., No. 5.
18. Schuetz. Wien. kl. W., No. 14.
19. Ehret. Muench. med. W., No. 3.
20. Moynihan. Edin. Med. J'l., May. Interstate, p. 817.
21. Gabbi. Rif. Med., No. 17.
22. Hawkins. Brit. Med. J'l., Jan. 13. Interstate, p. 533.
23. Armstrong. Brit. Med. J'l., Jan. 13. Interstate, p. 533.
24. Hutchins. Am. J'l. Obst., Sept.
25. Voelker and Lichtenberg. Muench. med. W., No. 3.
26. Holland. Lancet, June 2.
27. Ludloff. Muench. med. W., No. 25. Interstate, p. 897.
28. Koplik. Med. Rec., Sept. 29.
29. May. Muench. med. W., No. 8. Interstate, p. 534.
30. Viereck. Muench. med. W., No. 29.
31. Assmann. Muench. med. W., No. 28. Interstate, p. 744.
32. Gibson. Ann. of Surg., April.
33. Ewald. Berl. kl. W., No. 9.
34. Staeuble. Arch. f. klin. Med., No. 3.
35. Given. J'l. Obst. and Gyn., April. Interstate, p. 818.
36. Kast. Berl. kl. W., Nos. 22, 23.
37. Doerner. Muench. med. W., No. 10.
38. Einhorn. Med. Rec., Feb. 10.
39. Simon. Berl. kl. W., No. 44.
40. Hess. Med. Rec., April 28.
41. Ziegler. Zeitschr. f. kl. Med., No. 6.
42. Kaliski. Deutsch. med. W., No. 5.
43. Kuehn. Muench. med. W., No. 50.
44. Horwitz. Arch. f. Verd., No. 4.
45. Alexander and Schlesinger. Deutsch. med. W., No. 22.
46. Saito. Berl. kl. W., No. 40.
47. Einhorn. Deutsch. med. W., No. 20. Interstate, p. 599.
48. Sahli. Deutsch. med. W., No. 30.
49. Sahli. Corresp.-Bl. f. Schw. Aerzte., 1905, Nos. 8, 9.
50. Boas. Centralbl. f. inn. Med. No. 24. Interstate, p. 672.
51. Schumm and Westphal. Zeitschr. f. phys. Chem., Nos. 5, 6.
52. Schlesinger and Holst. Deutsch. med. W., No. 36. Interstate, p. 898.
53. Cabot. N. Y. Med. J'l., May 12.
54. Tognetti. Gaz. deg. Osped., No. 60.
55. Buchner. Muench. med. W., No. 24.
56. Krokiewicz. Muench. med. W., No. 11. Interstate, p. 534.
57. Gaetgens. Muench. med. W., No. 23.
58. Conradi. Deutsch. med. W., No. 2; Muench. med. W., No. 34. Interstate, p. 325.
59. Keyser. Muench. med. W., Nos. 17, 40.
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SURGERY.

 IN CHARGE OF

 WILLARD BARTLETT, M. D.

An American surgeon, who is today generally acknowledged to be the leading exponent of stomach work, stated less than twelve months ago that in his opinion modern gastric surgery was less than five years old, and the best of it not yet two years old. The most striking advances which the year 1906 has to record in surgery can, I believe with justice, be ascribed to this field. In addition to this, fully as *much* has been written on this as on any other subject, since the appearance of our last progress number.

It is only reasonable to suppose that the time and space at disposal of one reviewer make it impossible to give an adequate general resume of all that has appeared within this time.

The above considerations have impelled me to devote this department to a review of the stomach literature of 1906, and I trust that the reader will agree that this is fairly comprehensive. It seems to me especially fitting that just such a review should have a place in our JOURNAL, which appeals widely to general practitioners. They are the men above all others who should know what is being done in advanced stomach work, since they are the men who first see these cases, in many of which an early diagnosis is the key-note to success or failure in surgical treatment, if such be applicable.

ANATOMY AND PHYSIOLOGY.—Of the numerous articles which appeared last year on the anatomy and physiology of the organ, none takes higher rank than that of Leven and Barret (*Presse Med.* Nr. 63) on comparison of the infant and adult stomachs. In the infant, a large part of the stomach lies to the right of the middle line, while in the adult only the pylorus does this. The lower border of the infant stomach descends considerably more than does that of the other. The stomach of a grown person confines itself almost completely to its contents, while in the infant stomach there is usually a very considerable amount of air above the fluid, which it contains. In the infant the whole stomach contracts at once when food is taken into it. This, however, is very rarely seen in older life. Milk remains in a baby's stomach from $1\frac{3}{4}$ hours to 2 hours, as a rule.

Holzknicht (*Berliner Klin Wochen.* Nr. 5) like many others mentioned in this review, used bismuth and the X-ray with most gratifying results in determining hitherto disputed points regarding the stomach. He finds that a normal organ is very uncommon and that most of us have a dis-

placement, downward, of the viscus. However, in the perfectly normal stomach the pylorus is its very lowest point. He was further successful in picturing quite a number of cancers which could not be felt or otherwise located, but which were later removed at operation.

One of the recent advances in the diagnosis of stomach troubles comes from Leven and Barret (*Presse Med.*, 1905, Nr. 74) (rev.). The patient is allowed to take a Bismuth pill and is then photographed in various positions, the boundaries of the stomach naturally being determined by the position of the heavy pill, which must always be in the lowest portion of the viscus. The idea is so simple that it should be considered brilliant if efficacious.

The movements of the stomach and intestines were most instructively dwelt upon by Cannon and Murphy in the April number of the *Annals of Surgery*. They fed cats with bismuth and then viewed the stomach motions with the X-ray. They found that the normal organ commenced to functionate within ten minutes after a meal and was empty about three hours later. After intestinal resection, stomach contents were not forced into the intestine until five or six hours after eating, and this is regarded by the authors as Nature's effort to protect the weak spot. The contents passed the situation of an end to end union very much better than it did a lateral union. After the intestine had been ligated, contents went down as far as the ligature and then returned to the stomach. After the blood vessels of the intestine had been thrombosed, both stomach and intestine remained perfectly quiet. All sorts of insults to these viscera resulted in a slowing in their movements.

Brauner (*Archiv. fur Phys. u. Med. Technik*, Bd. 1, Hft. 1. Rev.) writes of his success in stomach diagnosis with the aid of air inflation and bismuth. He was able not only to demonstrate the presence of ulcers, tumors, etc., but in consequence of demonstrating that motions of the pylorus were absent, he properly concluded in one case that the stomach wall was so infiltrated as to make movement impossible. An operation demonstrated the correctness of this rather hair-splitting conclusion.

OPERATIVE TECHNIQUE.—Leriche (*Revue de Chir.*, Nr. 7), contributes a lengthy article on the technique of stomach resection for cancer. He lays great stress on the fact that such an operation must necessarily remove all of the lesser curvature, if the patient is to be substantially benefited. On the other hand the disease is not likely to go far over onto the duodenum, hence, not over 2 to 4 cm. of this viscera will have to be sacrificed. The method of procedure in the clinic at Lyons is as follows:

1. The four cardinal ligatures are applied.
2. The stomach is cut off as high up as desired.
3. The cardiac end is sutured.

4. The rest of the blood vessels running to the greater and lesser curvatures are severed.

5. The duodenum is divided.

6. Same form of anastomosis is made.

The operation of Kocher, which unites the end of the duodenum to the posterior wall of the resulting little stomach, is the one which nearest approaches anatomic conditions, but recurrence which is most likely to take place in this vicinity is likely to give most trouble where this method is followed; however, one point brought out by this author, and not commonly noted, is that a recurrence so situated can always be subjected to a second operation and then some other form of gastroenterostomy done. The chief anatomic objection to the Kocher or the first Billroth method has been that it is hard to mobilize the stump of the duodenum. However, it is possible by cutting the peritoneum to so loosen the gut in every instance that a great deal of space can be gained for treating the upper end of it in any method desired. The "Y" operation may also be used in this connection, but our author, although a Frenchman, very wisely decides against the practicability of doing this.

The undecided question as to whether gastroenterostomy or Finney's operation is the better procedure in ulcer is discussed by White (*British Medical Journal*, Oct. 7, 1905). He states briefly that the great disadvantages of the former operation are vicious circle, the occurrence of ulcer in the wound or gut lower down and infection of the bile passages. He regards all these dangers as avoided by the second procedure mentioned and uses it in practically every case. He reports five such instances in which the patient was completely cured.

Fresh impetus is given to the use of the so-called Finney operation by the three years' experience detailed by the author of the procedure in *Surgery, Gynecology and Obstetrics* for February, 1906. He has now done thirty-three of these operations with uniformly good success. He says that all conditions have been met, such as dilatation of the stomach, dense adhesions, thickening of the wall, acute and chronic ulcer, hemorrhage and spasm. He advises that interrupted stitches be used, by all means. Gastroenterostomy is now used by Dr. Finney only in cancer where a radical operation proves to be impossible. The opening should be 10 cm. long. Postoperative nausea and vomiting are almost absent, due, as the author suggests, probably to division of the pyloric muscle. There has been no case of death due to the operation itself. This subject is brought clear up to date by a letter from Dr. Finney to the reviewer, bearing the date of November 28th. In this letter he states "I am glad to be able to say my experience with the operation of pyloroplasty continues to be satisfactory.

The technique of gastroenterostomy received from Wm. J. Mayo in *Annals of Surgery* for April, what time will probably prove to be its

finishing touch. In this article Dr. Mayo illustrates the method which he and his brother, C. H. Mayo, have been using constantly since July, 1905. It is scarcely necessary to state that it is a posterior no-loop gastro-enterostomy. This new procedure may be most readily grasped when it is stated that the stomach and intestines are joined in such a manner that the highest part of the jejunum has its normal direction and relations in no way disturbed, as is inevitable in all earlier methods. After all the sutures are in and the viscera are dropped back into the abdomen, the gut points to the left and downward, which effectually prevents the occurrence of vicious circle.

Brunner gives the results of his stomach operations in the *Beit. zur. Klin. Chir.*, Bd. 49, stating that acid stomach contents have the most pronounced effect upon the development of germs in this viscus. Consequently, one is prepared for the statement that infections most frequently follow cancer operations, because there being little or no acid present in this disease, germs are particularly virulent, and the escape of a comparatively small number is likely to be attended with the greatest trouble. Out of 106 operations, he lost three patients and these from resections. He advances a most telling argument against the first Billroth method when compared with the second. He says that recurrence of cancer is most common in the line of incision through the stomach; naturally enough this must lead to obstruction at the new joint with the gut, if the first method be followed. However, this complication cannot be effective when the second method is followed even though a recurrence take place, and this is borne out in fact. There has been a great deal of trouble in taking care of the stump of the duodenum, the author does this by bringing it up and sewing it to the anterior abdominal wall. He states that many surgeons have lost patients from the stitches giving way at this point. He has had nothing worse than a fistula in consequence of his treatment. He states that he has one patient living seven years after the resection of a cancerous stomach. This is truly encouraging.

In France the "Y" operation for gastroenterostomy has always been popular, although the same can hardly be said of any other land. In Nr. 20 of the *Bull. et Mem. de la Soc. de Chir. de Paris*, Souligou reports two cases in which he did this, but added to the original technique torsion of the jejunum. Both of these were cancer cases, which makes it seem all the more remarkable that the French surgeons should choose the most time consuming instead of the quickest of all the procedures which have been proposed to drain the stomach. No doubt, the "Y" operation is the most nearly perfect from a mechanical standpoint, of all the gastroenterostomies; still, two different anastomoses must be made, and it is time-consuming in the very best of hands.

A new clamp for use in gastroenterostomy and other forms of lateral anastomosis is proposed by Linnartz (*Zent. fuer Chir.*; Nr. 26). This

instrument consists of three branches, the middle one being heavier than the other two, the apparent purpose of it being to hold the opposed viscera in perfect approximation, a thing which is so difficult when two separate clamps are used. The purpose of it differs in no way from that of the simple clamps as used by Moynihan. The further advantage in using this instrument is that the presence of one assistant is thus done away with. The reviewer must state in passing that he saw a similar instrument used in Mayo's clinic before the publication of this author's article. It was stated by W. J. Mayo at the time that an earlier model of the same thing had been devised by a Colorado surgeon many months previously, hence, the German's claim to priority in this matter must be questioned, although no question arises as to his originality.

Another new method of performing gastroenterostomy is described by Pleth in the *American Journal of Surgery* for June. He sews together the opposed viscera with one row of stitches, then pierces each with a long darning needle, the two needles lying parallel to the suture line and close to it; he then places a sort of continued drawstring in front of and parallel to the needles, and after this is done cuts down on to these in such a way as to remove them, after which the drawstring is immediately tightened, and the anterior lips of the wound brought together before contents can escape. The idea seems simple and reasonable, at least it will repay one for a perusal in the original.

A new clamp intended to prevent the escape of stomach and gut contents during gastroenterostomy is described by Maunsell (*Med. Press*, Feb. 28, 1906). It differs very little from the instruments already in use, in as much as it consists of two separate clamps, one for the stomach and the other for the intestines. The value of the new apparatus lies in the fact that these two clamps can be securely fastened in the correct position for suturing, and thus is eliminated the chief drawback to the use of the older instruments.

Joseph described a new method of performing gastroenterostomy in the *Zent. fuer Chir.* of May 19th. This consisted in thrusting one branch of a sharp-pointed clamp through the stomach wall and the other through the intestinal wall. When the clamp is closed it naturally brings together the portions of these viscera which are included between its branches. A row of sutures is then introduced clear around the instrument, and an opening established between the sutures by means of a little hidden knife, which plays between the branches. The instrument is then withdrawn, and the work completed by a single stitch, which closes the resulting opening.

A new method of lateral anastomosis is proposed by Werelius (*Surgery, Gynaecology and Obstetrics*, Vol. II, Nr. 3). It is so similar to Flint's proposal, which is reviewed herewith, as to scarcely need a separate description. Instead of the scissors, however, as used by Flint, this author

cuts through the viscera with a piece of thread between two parallel rows of sutures, which have been tied and thus protects the peritoneum.

A new method of performing gastrostomy is advanced by Prof. Tavel (*Zent. fuer Chir.*, Nr. 23), of Bern. After stating the well-known disadvantages of the older methods, he makes the very interesting proposal to first of all resect about 15 cm. of the patient's small gut, and then, after reuniting the intestine, to sew the mouth end of this small section into the anterior stomach wall and the anal end into the skin. He did this in a number of dogs and one human with the most gratifying results. There was no leakage in consequence of the fact that such a piece of small bowel has always the tendency to propel ingested material toward the stomach.

A new method of making anastomoses in the gastrointestinal tract is the title of an article by Flint (*Archiv. fuer Klin. Chir.*, Bd. 80, Hft. 4) of California, who worked in the laboratory of Paltauf. He bases his reasoning on the fact that it is desirable to perform these operations without opening the cavities of the viscera. He contemplates a lateral union, and his technique is greatly elucidated by half a dozen illustrations. However, it may be possible to give the main ideas in words alone. He sews together with one or two rows of stitches the viscera to be joined and then thrusts into each and out again, parallel to this row of sutures one branch of a peculiar long, slender scissors which he has had especially constructed. Parallel to the first row of stitches, but in front of the scissors, he puts in another row of stitches and after tying them, simply closes the blades of the above mentioned instrument and thus very simply establishes a communication between these two hollow organs. He states that this can be done very quickly and he has performed it twenty-four times on dogs without the least soiling. To further show how nearly impossible it is for anything to escape he did his operation on human intestines filled with water, without losing a drop of the same.

The literature of 1906 was decidedly enriched by the publication of Alfred H. Gould's book, entitled: "The Technique of Operations upon the Intestines and Stomach." (W. B. Saunders & Co.) Of course, space cannot be here devoted to a complete book review, but it is sufficient to state that this work impresses the reviewer as being the best at our command on this subject. No attempt is made to simply repeat every operative procedure, which has been invented up to date, but, on the other hand, only those of proven value are included. This is, however, not all. The book contains the results of Gould's own original experiments which have been carried on for the past three years and is the best illustrated and clearest exposition of this subject which is at our service.

The difficult point of how to treat the stump of the duodenum in pyloric resection after the second Billroth method, is most instructively discussed by Kausch (*Zent. fuer Chir.*, Nr. 5): His authority to discuss

this subject becomes apparent when it is stated that he was the son-in-law and assistant of the late Prof. Mikulicz, who did 184 stomach resections before he died. At the famous Breslau clinic, peritonitis was not uncommonly seen as a result of the stitches in the end of the duodenum giving way. At the same time the circulation in the walls of the remaining portion of the stomach is stated not to have been any too good when the second method was used. The use of gauze packing after such operations only served to make matters worse. The principle of the first Billroth method is, without a doubt, the correct one and our author believes that the operation should thus be carried out whenever it is possible. The second method is to be used only in case the duodenum must be cut off so low as to leave a large portion of it uncovered by peritoneum, and hence useless for purposes of anastomosis.

In writing of cardiospasm, Bruening (*Beit. zur Klin. Chir.*, XLVIII bd., Hft. 2) states that in his opinion the best operation is dilatation of the muscle ring, by means of an instrument introduced through the stomach backward. He reports such a case completely cured after half a year had elapsed. He considers that dilatation from above is accompanied by great danger, and is at the same time uncertain in its effects.

The proposal to do a gastrostomy in certain forms of peritonitis comes from Gauthier and Pinatelle (*Province Med.* Nr. 24 Rev). The idea is to prevent the exhausting vomiting, which accompanies peritonitis, as well as the pressure upon heart and lungs by a greatly dilated stomach. In three cases, this was tried, two patients recovered, and the authors naturally concluded that their operation had something to do with the matter.

GASTRIC ULCER IN GENERAL.—The most exhaustive and valuable article of the whole year on the treatment of gastric and duodenal ulcer appeared in the *Journal of the American Medical Ass'n* for the ninth of September from the pen of W. J. Mayo. At the Mayo clinic, six hundred of these cases had been operated upon prior to the first of May of this year. In writing of perforation Dr. Mayo states that he and his brother, Chas. H. Mayo, have operated upon seven affecting the stomach with two deaths, and nine affecting the duodenum with three deaths. The plan at Rochester is to sew up the opening and then keep the patient in the semi-sitting posture, with a tube in the pelvis. It is of the greatest importance, as he states, that these patients be operated upon as early as possible after the accident occurs, since nearly all die in which treatment is instituted after ten hours. The operation which is recommended for acute recurring hemorrhages is the following: The stomach is opened and the bleeding ulcer sutured well back with catgut, which penetrates all the coats in healthy tissue. Then, on the exterior of the organ, this point is reinforced with a few Lembert stitches. Five patients so treated recovered. Three hundred and eighty-three gastroenterostomies

have been made at St. Mary's Hospital, Rochester, for ulcer, and the Mayos are able to state definitely that this procedure gives most benefit where there is the greatest amount of stagnation. Where there is no mechanical interference, excision of the ulcer is the most logical procedure, especially is this true of lesions situated in the lesser curvature. A partial resection of the stomach also is of the greatest benefit in many of these instances. A further reason for complete removal of the pathologic condition is that cancer may, in this way, be prevented. The Finney operation is used and highly lauded by the Mayos for pyloric spasms, and is stated in this paper to be the one greatest advance since the days of Billroth. It is gratifying to note that 90 per cent of ulcer cases can be cured by proper surgical treatment in the opinion of our distinguished author.

The surgical treatment of gastric ulcer received attention at the hands of V. Eiselsberg (*Mittheil, aus den Grenzgeb. dër Med. and Chir.*, Bd. 16) in a lengthy article which deals rather with the subject in the abstract and reports only a few of the author's results. He has had six cases of perforation of which five were in the anterior wall, and states that the only hope for these people is the earliest possible operation. In one of these instances resection of the ulcer-bearing area had been made a year previously, but in spite of this, secondary ulcers had formed. Three of his cases were completely cured. He does not operate for hemorrhage during the time that the patient is bleeding and states that it is exceedingly difficult to find the bleeding point as a rule. It is different, however, after the bleeding has ceased. Then an operation can be done, which contemplates a radical cure of the condition, namely, gastroenterostomy, resection, etc. Gastrolisis has no place in modern surgery and about the same thing can be said of pyloroplasty. (The author surely cannot include the Finney operation in his remarks; however, he is one of the German writers who do not quote American literature, hence, it may be possible that he never heard of it.) He has treated pyloric spasm twice by gastroenterostomy and twelve times by pyloroplasty, considering the former in the light of his small experience to be far the better procedure. The article does not go at all into the technic of the various operations proposed.

One of the most valuable experimental articles which appeared during the year was that by Fibich (*Archiv. fuer Klin. Chir.*, Bd. 79) upon the cause of gastric ulcer, being cured by gastroenterostomy. He made twelve experiments, which were calculated to cause gastric ulcers by excising portions of the mucous membrane within an area from which the blood supply had been cut off by ligation. He was, in this way, successful in producing lesions quite different from those resulting from similar mucous membrane defects with normal blood supply. He found, however, that such an ulcer healed very rapidly after a gastroenterostomy

had been done. In fact, it showed about the same tendency to heal that was exhibited by a mere defect of the kind mentioned in which no gastroenterostomy had been done. In some instances he made a gastroenterostomy at the same time he produced the experimental ulcers, but in others weeks were allowed to elapse before the stomach and gut were united. Simple mechanical drainage was not enough to explain why gastroenterostomy causes these ulcers to heal, since the stomachs upon which he worked were already being properly drained before he produced the ulcer. The article gives proof of a negative sort, however it must be considered of value as at least tending, in a measure, to solve the problem presented.

Fifty-two gastric ulcer patients are reported by Hofmann (*Beit. zur Klin. Chir.*, Bd. 50) as having been operated by v. Hacker. It is stated that blood was vomited in only one-fourth of this number and only very few more ever had blood in the stools. Pyloric stenosis was seen thirty times, and hour-glass stomach in three instances. Fifteen ulcers had perforated either into the abdominal wall, the liver or the pancreas. One can gain an idea of this surgeon's results by the statement that one-third of those last named fifteen patients died, the causes being as follows: One from collapse, one from hemorrhage, one from peritonitis resulting from stomach contents being spilled at the operation, and one from peritonitis because the sutures did not hold. It is astonishing to still read these reports of comparatively few cases from small German clinics and note their antiquated technique and high mortality, observing at the same time that they quote nothing but German literature and thus make no reasonable effort to improve. In the article under discussion no mention is made of an English-speaking surgeon, which is all the more remarkable when we take into consideration that the Mayos, Robson and Moynihan have each had hundreds of cases with an astonishingly low mortality. It is to be hoped that certain German surgeons will some day wake up to the fact that they have long since been out-distanced in this field of surgery, as far as both quantity and quality are concerned.

Gastroenterostomy is still adhered to by W. J. Mayo in his latest paper appearing in the *British Med. Journ.* for November 10, as a routine treatment for ulcer of the duodenum; by simply giving the parts rest, it promises a permanent healing. The posterior no-loop suture anastomosis is now done by Dr. Mayo and referred to elsewhere in these columns as the operation of choice. In a few cases he has excised these ulcers and done this with good results. At Rochester they had done 1112 stomach and duodenal operations when this paper appeared, and in only two instances had primary cancer of the duodenum been seen. The treatment of perforated ulcers in this situation is the same as those in the stomach.

In the *Annals of Surgery* for August, Maclaren had an interesting article upon the treatment of benign obstruction of the pylorus and ulcer

in general. He judges that many ulcers never give pronounced dyspeptic symptoms from the fact that perforations occur in people who have been seemingly healthy. He thinks that gastroenterostomy in acute perforation can only be harmful, and bases his reasoning upon the fact above mentioned, and the further statement that very many acute ulcers recover permanently without surgical treatment. A post-mortem observation of his would tend to show that at least some of the pyloric stenoses in infants are due to a fibrous thickening of the pyloric region. Stress is laid upon the fact that we cannot be too careful in differentiating between ulcer cases and certain of that nervous group of dyspeptics, in which we find examples so closely resembling the first named as to make diagnosis difficult.

A two-hundred page article by Kreuzer (*Beit. zur. Klin. Chir.*, Bd. 49) gives in minutest details the experience of the last seventeen years in the Zuerich clinic in the surgical treatment of gastric ulcer. However, the article in reality covers the same ground as that read by Prof. Koenlein at this year's meeting of the German Surgical Association, hence, the review of this last named article will really suffice for both.

Professor Kroenlein (*Verhandlungen der Deutsch Gesellsch. fuer Chir.*) having operated upon 112 patients for gastric ulcer presents one of the most interesting and valuable reports which has appeared upon this subject. He is convinced that medical treatment has no effect upon at least one-fourth of these patients, and that about 12 per cent of them die under treatment. On the other hand many of the other three-fourths are cured by a proper surgical operation. Such a procedure has less than 10 per cent mortality, and in his own hands the per cent of those completely cured years later was sixty-one. In addition to this a further 24 per cent were benefited. After an operation his experience has been that a properly drained stomach rapidly recovers from dilation, its secretion becomes normal and when an anatomical examination is made later, the ulcer is found to be transformed into a scar. Even though bile may find its way into the stomach, it apparently does no harm and ceases to do this later on, as a rule. As to the method, which is best, it may be said in general that a posterior gastroenterostomy more nearly fulfills all requirements than does any other single procedure. Excisions of the ulcer should be reserved for rare cases, although it may in certain instances be all that is necessary or be combined with the above-named operation. He does not believe at all in pyloroplastic, and resection is to be practiced only when there is a suspicion of cancer. The author does not operate at all on patients in whom the proper sort of a medical cure has not failed repeatedly, and then the chief disturbances which guide him are stenosis, motor insufficiency and dilation. Of course, small hemorrhages frequently repeated are in themselves enough to warrant an operation, but after a very copious bleeding, it is usually necessary to let the patient recover from the shock before a radical cure can be attempted.

An article by Brenner (*Archiv. fuer Klin. Chir.*, Bd. 87) entitled: "Gastroenterostomy or Resection for Callous Ulcer," must be taken seriously as going one step toward clearing up a much disputed question. Especial interest attaches to his report of three cases, in which he was able to prove at second operations that a gastroenterostomy can completely relieve, not only the symptoms, but the anatomical condition of callous ulcers. He admits, however, that many cases have been reported in which after so radical an operation as resection of the ulcer area, a second ulcer formed and the patient bled to death in consequence. He did twenty-one resections for the lesion under discussion with 28 per cent mortality, and thirty gastroenterostomies with 13 per cent mortality. His percentage of cures was about the same for each of these two forms of operation, hence, he concludes that it is better surgery to employ the one which has decidedly the lower mortality, namely, gastroenterostomy.

An interesting and well thought-out contribution to the treatment of non-malignant diseases of the stomach comes from the pen of Gelpeke (*Archiv. fuer Klin. Chir.*, Bd. 80, Hft. 4.) He begins by stating that the mortality of gastroenterostomy under such circumstances is about 10 per cent. Then he mentions the fact that a large number of these operations are not ultimately successful on account of shrinkage, adhesions and other postoperative changes. On the other hand he considers pyloroplasty to be at least theoretically ideal and supports his position by stating that the mortality is less than in gastroenterostomy, while no functional bad result, such as vicious circle is possible. Of course, he does not advise this last named operation when there is any thought, or even any possibility of cancer. In such cases a resection is to be done by all means. In a certain number of cases he has added gastropexy to pyloroplasty and with the happiest results. His technique contemplates attachment of the middle of the anterior wall to the cartilage of the lowest rib. He says that this has no ill effect upon the activity of the stomach and considers it fully as much indicated for a displaced stomach as nephropexy can be indicated by displacement of the kidney. It is easier to do and there is great certainty of a permanent good result.

A case which required a more than usually extensive operation for gastric ulcer was reported by Jaeger (*Med. korres. des Wuertenb. aerzrl. Landesverb.*, Nr. 49, Rev.) The ulcer had perforated into the anterior abdominal wall, a considerable portion of which had to be removed when a resection of the stomach was performed. The patient got perfectly well and it is interesting to relate had no hernia, although a section, half as large as a saucer, had been removed, including a portion of the rectus muscle.

The treatment of gastric ulcer receives an impetus in reading the results published by Mueller (*Inaug. Diss. Rostock*, Rev.), who reports forty-nine cases operated upon. Out of thirty-seven patients, whose histories could be traced, only three failed to be greatly improved.

It has long been known that gastric ulcers may be single or multiple, but a case reported by Ahrens (*Med. korrespondenzbl. d. Wuerttemb. aerztl. Landesvereins*, May 26, Rev.) is almost without a precedent. There were eight or ten within a space as large as a saucer, one of them having perforated into the liver substance. This patient recovered, however, after a gastroenterostomy.

Moynihan, whose many contributions to gastric surgery have decidedly enriched the subject, reports (*Mitteilungen aus den Grenzgebieten der Medizin und Chir.*, Bd. XVI, Hft. I) twenty-three cases of hour-glass stomach operated upon. Four of the patients died, but the others were completely cured. In only seven did he do a gastroenterostomy, the rest being some sort of plastic operation on the stomach itself. He is not at all convinced that such a condition is ever congenital, the facts seeming to indicate that some form of ulcer is most usually at fault. One of these twenty-three stomachs had two constrictions in it, and was consequently divided into three separate sacs. In another, three constrictions were found.

An interesting case is presented by Koenig in the *Deutsch. Med. Wochen*, Nr. 33. He operated upon a patient in whom the diagnosis of gastric ulcer had been made, and found a new mass almost as large as the palm of the hand, seated like a saddle upon the lesser curvature. In the middle was a deep crater, and a gastroenterostomy was done; of course, excision was impossible. A few months later, the same patient was operated upon for secondary hernia, when to the surgeon's astonishment the tumor was found to have completely disappeared, there being only a few faint adhesions to mark the spot where it had been.

Another case in which a supposed malignant tumor of the stomach disappeared after gastroenterostomy is reported by Wallis (*British Medical Journal*, July 14). At the first operation he made up his mind to resect later, after discovering a large tumor of the pylorus and lesser curvature. However, when he opened the abdomen a month later, he found absolutely nothing but a sharply outlined ulcer marking the spot.

One of the valuable articles of the year is that of Kramer (*Beit. zur Klin. Chir.*, L. 1, Bd., 2 Hft.) in which he details the recent experiences of the Heidelberg clinic in the treatment of benign stenosis of the pylorus. This material consists of 139 cases, a number which is certainly sufficient to warrant conclusions that may prove instructive, and the author's chief lessons in the article are with regard to the lasting condition of the new opening and of the resulting gastric functions. He saw, after a number of operations, large inflammatory tumors completely disappear, but in 120 cases, 11 secondary operations had to be performed on account of renewed stomach symptoms. One of his patients bled to death twenty-five days after the operation. At the autopsy, a large open vessel was found in the base of the ulcer, which had caused all the trouble.

"Ulcer and cancer of the stomach; their Relationship," is the title of an article which appeared in the *Journal of the Minnesota State Medical Ass'n* on June 1st. It is from the pen of Christopher Graham, physician to St. Mary's Hospital at Rochester, Minn., and by reason of this fact, as well as for its intrinsic value, must be treated at length. The author's conclusions are that the very great majority of ulcers of the stomach are located at the pyloric end. The immediate pylorus comes first, the lesser curvature second. A small per cent is found elsewhere, few at the cardia. That the great percentage of cancers of the stomach are found at the pylorus and lesser curvature (pyloric end), that is, the same locations finds the greatest number of each. That quite a percentage (50-60) of patients suffering from carcinoma give three or more years of pre-cancerous history. That a growing percentage of cancer cases is found with short histories and ulcer demonstrated as the earlier lesion. That there is a percentage, if small, of short ulcer histories leading to acute pyloric obstruction where the ulcer must have been present for quite a period, and latent. That ulcers may be present for an indefinite period and no symptoms follow until obstruction, perforation, and hemorrhage appear, if the acidity is low or absent, and the ulcer locates itself along the lesser curvature or near the pylorus. That cancers may develop under the same gastric conditions and manifest themselves only when obstruction or systemic poisoning makes itself felt.

Gastric ulcer and cancer were treated of in the *Boston Med. and Surgical Journ.* for August 23d by Graham in the well-known way which characterizes everything that emanates from the clinic at Rochester. In ulcer, four stages are mentioned, and in the third or fourth, cancer may be expected to develop, if at all. The good appetite which may be present in the first stage usually grows less in the others, or, if present at all, the patient dares not eat to save himself distress. Loss of weight now takes place, while, indeed, just the reverse may be noted in the first or second stage. Ulcer is given as a direct cause of cancer in more than three-fourths of the stomachs which have been removed at Rochester, and this should go far to convince us to a radical treatment of gastric ulcer where discovered early.

PERFORATION.—It is encouraging to note that during 1906 several patients were successfully operated upon for perforation of stomach and duodenal ulcers. Two of these by Blecher (*Deutsch. Militaer Zeitschrift*, Hft. 3, Rev.) are reports of cases in which the opening was sewn up and the patients promptly recovered. One was in each of the viscera mentioned. In one, a stomach fistula remained sometime, but closed spontaneously. Both of the patients had seemed perfectly well up to the time of the accident, which makes the matter all the more interesting.

An article by Miles on perforated gastric and duodenal ulcer is of more than ordinary value. He had a personal experience with forty-six oper-

ated cases, and states that the trouble is usually on the anterior wall. One point must be borne in mind that the well-known initial symptoms subside very rapidly, so that a timely operation may be neglected in consequence. After sewing up the opening he does not put in a local drain, but places a tube in the pelvis and maintains the American or Fowler position. Of the greatest importance is the following: Only 18 per cent of these patients died when the operation was done within the first twelve hours, but on the other hand forty-four to ninety-two per cent died where this was undertaken after that.

An article by Noetzel (*Beit. zur Klin. Chir.*, L. I bd., Hft. 2) founded upon an experience of sixteen cases, dwells exhaustively on the subject of operation for perforated gastric ulcer. The author, as an assistant of Prof. Rehn, at Frankfort, and in such a well-known school, naturally came in contact with the best methods. Five of his patients were operated upon within ten hours, and only one of this number died. Only one lived, however, when the operation was done twenty-four hours after the accident, and none of those got well who were operated upon on the third day. None of the perforations were on the posterior wall, which is a fortunate thing, as far as surgical treatment is concerned. In half of the cases only was it possible to make a correct diagnosis in advance, and it may be stated in passing that this can be done only by eliciting most carefully the patient's past history. However, the author very correctly states that the necessity of operation in general is here much more important than the matter of diagnosis alone. He considers two points of supreme importance in operating; the first of these is to close up the opening in the stomach, and the second is to take care of the infection, which has already spread into the peritoneum. It is not enough to simply suture up the opening, but far better, where feasible, to excise the ulcer. Furthermore, a gastroenterostomy is to be added if there is any stricture of the pylorus, and the patient is in condition to stand it. The author drains with gauze down to the suture line and then places tubes in the pelvis in the American manner. It is very evident that the chief point, with regard to operative success, must always be the time which lapses between the perforation and the operation.

Cases, in which gastric ulcers perforated, were reported by Milko (*Budapesti Orvosi ujsag*, 1906, No. 3, Rev.), and these teach the same important lesson that an operation must be done early, that is, within the first few hours, if it is to be successful. In one case, he did a gastroenterostomy at the original operation, which was performed three hours after perforation and with complete success. Later, however, union had to be made between the two limbs of gut, on account of vicious circle.

Three cases were reported by Renton in the *Glasgow Med. Journal* for September, in which gastric ulcers ruptured and in all three, the patients' lives were saved by a very timely surgical operation. It is worthy of note

that this surgeon saved all three of his cases, something which could not possibly have been done had the operations not been undertaken relatively early.

An interesting case of rupture of the stomach with diaphragmatic hernia is related by Dexenberger (*Muench. Med. Wochen.*, Nr. 7). His patient suffered this accident in consequence of violent vomiting after overloading the stomach. He had suffered years before from an ulcer of the stomach, which had resulted in partial closure of the pylorus. In consequence of this the organ was thinned out in this region so that it did not take as much force as might have been expected to burst it. The gastric contents emptied itself into the left pleura, and the patient died almost at once.

One naturally supposes that a large hole in the stomach is bound to let the contents of that viscus out into the abdominal cavity, but a case was recently observed by Haim (*Wiener Klin. Wochen.*, 1905, Nr. 47), in which the escape of food was avoided in an unique way. A young man stabbed himself in the stomach and when operated upon was found to have an immense blood clot completely blocking the opening in the above mentioned viscus. The wound was sutured and the patient made an uninterrupted recovery.

A most unusual case is reported by Chutro (*Revue de Soc. Med. Argentina*, Nr. 73, Rev.), who reports an instance in which a child was kicked in the left side of the abdomen by a horse. The little one vomited for five days when the mother commenced to notice a new mass forming at the site of injury. The abdomen was opened and in the wall of the stomach, between the mucous membrane and the muscle, was found a new formed cavity of considerable size, which contained a yellowish green fluid. This was drained and the patient got well without further incident.

GASTRIC FISTULA.—In the *Revue de Chir.*, Nr. 7, appeared a valuable article by Patel and Leriche on gastric fistula following ulcer. This is a rare lesion. Seven cases are reported, two of them from the clinic at Lyons, with which these two gentlemen are connected. Such a fistula is rare because to produce it an ulcer must be on the anterior surface of the stomach and be the site of dense adhesions, both of which conditions are rather uncommonly met with. The symptoms are of two kinds, the first premonitory, and the second directly those of the fistula itself. As far as diagnosis is concerned, these are divided theoretically in two parts, the first locating the source of the fistula, and the second, its cause. The treatment is to be divided into two kinds, inasmuch as the ulcer is situated high or low in the stomach. A gastroenterostomy may possibly cure such a lesion, when situated high up, but this is doubtful, and for those low down the only procedure which can hope to be effective is direct attack, namely, excision with suture of the stomach wall and abdominal wall separately.

Spontaneous fistula from the stomach through the abdominal wall is the title of an article by Kuzmik (*Beit. zur. Klin. Chir.*, Bd. 48), in which he reports a case which is said to be most unusual in the literature. His patient was a syphilitic woman, in whose left epigastrium a gradual increasing swelling was noticed. In a short time severe pain made its appearance in this region, and a little later a spontaneous opening took place through which stomach contents emptied itself in large quantities. After treating the skin for a time with zinc oxide, it improved to such an extent that an operation was undertaken for closure of the new canal. The stomach was sewn up after excision of the ulcer and then the abdominal wall closed. The patient made an uninterrupted recovery. The case is regarded by the author as being, without a doubt, syphilitic in origin.

Kaufmann (*Mitteil. aus den Grenzgeb. der Med. and Chir.*, Bd. 15) reports an unusual case in which a peptic ulcer appeared in the gut after gastroenterostomy, this being accompanied by the formation of a fistula between the stomach and colon. At the second operation, the gastroenterostomy opening was found to have closed completely. This operation had been done for gastric ulcer and for two years the patient got along as well as could be desired, gaining twenty-five pounds in weight. Then pain commenced once more in the abdomen, from which time it is supposed the jejunal ulcer commenced. A year later he complained of belching up gases, which had a fecal odor, and upon the stomach being washed out, feces were determined. Nevertheless, stomach contents did not stagnate at all, but passed out of the organ about as they should normally do, nor was it possible to determine that this material passed directly into the colon. However, colored material injected into the rectum very rapidly made its appearance in the stomach, hence, another operation was undertaken to repair the damage, the condition being found as above described. Naturally a most extensive stomach and intestinal operation was involved, however, the patient did well for six days, when he suddenly collapsed, and upon opening the abdomen, it was found that an anastomosis between the ascending and descending colon had given way; the result was death in a few hours.

A fistula between the stomach and bronchus is reported by Loeb (*Muench. Med. Wochen.*, Nr. 5). There has been ten of these cases described up to date. In the one under consideration, no cause is known definitely, and strange to relate, the patient suffered from it for about twelve years before coming into the author's hands. An attack of coughing would usually produce stomach contents. It was proven to be the case by staining the same with methylene blue. It is supposed that a gastric ulcer furnished the basis on which the trouble developed.

A harrowing recital by Perutz (*Med. Klinik*, Nr. 3, Rev.) describes the symptoms which may be expected in a case in which there is a path-

ological communication between the stomach and the colon. His patient had watery stools immediately after washing out the stomach. At the autopsy it was not long until the condition was readily explained by the finding of above mentioned.

An article which appeared in the *Beit. zur. Klin. Chir.*, Bd. 51, from the pen of Prof. V. Hacker is of unusual interest since it details the history of a patient who was alive and well more than five years after being fed exclusively through a stomach fistula. In 1900 this woman drank concentrated lye with a resulting stricture of the esophagus. This soon grew so tight that a stomach fistula had to be made and then after she was dismissed from the hospital, her family physician, in attempting to dilate the scar, succeeded in perforating the tube. She was returned to the clinic and saved by a most extensive operation, although at the time there was an extensive plegmoma in the mediastinum. After this she was content to take all her food through the fistula, chewing it herself and then pouring it into the stomach with a funnel. She was seen for the last time almost six years after the original operation and found to be weighing about thirty pounds more than when first seen. This report is especially interesting in view of the unsatisfactory results, both local and general, which have followed the use of the gastric fistula in the hands of many surgeons. No irritation of the skin appeared at any time in this case.

OTHER COMPLICATIONS OF OPERATION OR DISEASE.—One of the interesting complications of gastric ulcer was reported by Tileston in the *American Journal of Medical Sciences* for August. He reported three cases in which secondary ulcers were found in the esophagus. In one of these, perforation took place and the individual died. In another the parent gastric ulcer perforated with a similar result, while the third was simply an accidental post-mortem finding.

A rather unusual experience was reported by Quenu (*Bull. et Mem. de la Soc. de Chir. de Paris*, Nr. 27), in which, after resection of almost the entire stomach, he found at autopsy undertaken months later, the lower portion of the esophagus to present a most unusual appearance. It was dilated until its circumference measured 10 cm. at some points, and the wall was about 14 mm. thick. The operation had been undertaken for cancer of the pyloric region, the patient made an uninterrupted recovery and died later of recurrence. The interesting feature presented by this patient was that she wanted to eat almost constantly, and in fact did so, although she had practically no stomach left.

Burke reported a very unusual postoperative complication of gastroenterostomy in the April number of the *Buffalo Medical Journal*. This was the posterior operation, with additional enteroenterostomy. His patient remained perfectly well for four months and then commenced to vomit. At a second operation both of the new openings were found in

very much the same condition as at first, as far as outward appearances went, all the trouble having been caused by a band of mesocolon occluding the afferent loop. On closer examination it was not possible to introduce a finger into the gastroenterostomy opening, which had to be enlarged. The patient is now perfectly well.

Another of the interesting postoperative conditions recently mentioned is the formation of ulcer in the gastroenterostomy wound, an occurrence which has not been frequently noted by our authors. Cancer has not been found at Heidelberg to form often upon the base of an ulcer left behind. This observation is interesting, in view of the fact that it does not coincide with that of many other competent observers. In five cases, a secondary operation was necessary because the gastroenterostomy opening had shrunk too small to be of any use. This is remarkable, in view of the fact that the Murphy button was used in almost all of these patients. Thirty-five cases were examined after operation, and in twenty the motility of the stomach was perfect, and in only three of them was it enough interfered with to cause serious symptoms. The chemical examination of the stomach contents from these patients presents many interesting points, although a review of the same would lead us too far.

The important matter of intestinal disturbances, which occur after stomach operations, was considered at length by Anschuetz (*Mitteil. aus den Grenzgeb. d. Medizin.*, Bd. XV., Hft. 3, 4). He observed the most persistent diarrhea after gastroenterostomy, though the anastomosis was made not more than 50 cm. distance from the point where the gut begins. This occurred seven times in cancer cases, commencing from six to ten days after the operation, and four of the patients died in consequence. It is possible here, he states, that a mistake may have been made in choosing the loop of bowel, which was united with the stomach, so that almost all of the small gut was thrown out of function. It is interesting to state that in some of these patients a second operation, where careful selection of a high gut was made, turned out successfully.

The relation of dilatation of the duodenum to gastric disturbances was commented upon by Finney before the Johns Hopkins Medical Society (*Johns Hopkins Hospital Bulletin*).

Five or six years ago, upon opening the abdomen, a condition was found which was not mentioned in the literature, i. e., a dilatation of the duodenum with a patent condition of the pylorus. The patients had a history of indigestion for months or years, of nausea and vomiting, and symptoms that were indefinite but distressing. In all the cases there was Glenard's disease. Nothing that was done seemed to relieve the symptoms. The nearest to a description of the condition was a paper read by A. J. Ochsner in San Francisco, in which he reports fourteen cases. Four years ago, after an operation for gall-stones, a patient began to vomit,

and vomited until she died. At autopsy there was found a dilated stomach and dilated duodenum, but no lesion could be found. The duodenum passes behind the superior mesenteric vessels, the superior mesentery itself running down to the right iliac fossa. When the stomach is much dilated, filled with fluid, and has descended to the pelvis, there is a dragging on the mesentery and vessels. This is apparently the obstruction. To the proximal side the intestine is dilated, and at the distal side it is collapsed. Glenard also suggests that dragging on the mesentery might obstruct the duodenum. The explanation is not satisfactory for the condition. The dilatation is the effect, not the cause, though it may be both. Two cases have been reported after operations other than abdominal, one being a breast removal and the other an operation on the elbow. Schnitzler suggests that it takes place after anesthesia, particularly after chloroform.

One of the unique stomach cases of the year was reported by Mumford in the *Annals of Surgery* for January. He had done a gastroenterostomy for ulcer, with a result that was perfectly satisfactory, as far as improved conditions were concerned. However, on the fifth day there was sudden terrible pain with collapse, and the patient died ten hours later. At the autopsy a rent was found in the fundus of the stomach, which had returned to its normal size as in consequence of perfect drainage. It was this return to the normal which had caused all the trouble, since by so doing the afferent loop of bowel had been put upon a stretch, with the consequence mentioned above.

This case presented the anomaly that the ligament of Treitz was decidedly to the right of the spinal column. It is, no doubt, to be attributed partly to this fact that the unfortunate accident occurred.

Gosset (*Revue de Chir.*, XXVI, Nr. 1 and 2) writes most instructively of peptic ulcer in the jejunum after gastroenterostomy. He collected thirty-one cases, ten of which ended fatally. Half of these resulted from the anterior operation. The only suggestion which he is able to make as a result of his studies, looking toward the avoidness of this accident, is that some sort of plastic operation on the pylorus should be done where possible, instead of the gastroenterostomy.

Acute postoperative dilation of the stomach was seen by Halstead (*Surgery Gynaecology and Obstetrics*, Bd. II., 13) after fixation of the kidney. This resulted in death five days later and the stomach was so distended that at the post-mortem it was found to fill out almost the entire abdomen. The upper part of the duodenum was also greatly dilated. The article goes very deeply into the subject and is most interesting, it being stated that such cases have been observed after injuries to the brain and spinal column, and in Halstead's case there is no question as to a mechanical obstruction.

A most valuable contribution was given to the little-understood subject of gastromesenteric ileus by Finney (*Boston Med. and Surgical*

Journ., Aug. 2nd) who had a case in which pyloroplasty was done for gastric ulcer, with the result that the patient vomited until she died a few days later. The autopsy showed a partial obstruction of the duodenum and stomach, due to pressure by the mesenteric artery where it crosses the gut. He does not claim that this is the only cause of acute dilatation of the stomach, but states that such must very frequently be the case. A complete resume of the literature on this subject is given, and the article is beautifully illustrated by drawings from the autopsy in this case. The causes of the condition in general seem to be indiscretions in diet, enteroptosis, surgical operations, narcosis, etc. The symptoms are chiefly vomiting of large quantities, light colored at first, but growing darker toward the end, this continuing until the patient is exhausted and dies. In the treatment the position of the patient is of the greatest importance. He should not lie on the back, but upon the right side of abdomen with the hips elevated. Manual replacement of the viscera which by their low position are dragging upon the vessel in question should be carried out if necessary. Gastroenterostomy has saved such a case, although the condition has followed this operation. Washing of the stomach may be of value if carried out early enough.

Michaelis (*Muench. Med. Wochen.*, Nr. 18) relates the history of a patient who suffered from tetany and coma, which existed for a week after the pylorus become completely closed by a cancerous growth. However, after a gastroenterostomy was performed, the symptoms disappeared and later still a resection of the diseased portion was performed.

Gastric tetany is caused, according to Jonnesco and Grossman (*Presse Med.*, 1905, Nr. 52, Rev.) by a substance which is formed in the contents of stomachs in which there is stagnation; experiments of a very interesting kind led them to this conclusion. They injected the stomach contents of a man who was later cured by gastroenterostomy into animals and succeeded in producing tetany in them. This condition presupposed a lack of fluid in the system and is, as might be supposed, successfully treated by saline injections.

Quenu reported in the (*Bull. et Mem. de la Soc. de Chir. de Paris*, Nr. 24) a case in which stenosis of the pylorus followed the swallowing of hydrochloric acid. This patient was a farmer who mistook a bottle of hydrochloric acid for liquor and did not notice the difference until he had swallowed a portion of it. He commenced to vomit at once and drank a large amount of water in order to dilute the poison. However, vomiting kept up right from the first and he remained several weeks in bed, losing about forty pounds in weight and growing correspondingly weak on account of the fact that little or no nourishment was absorbed. An operation for the relief of his condition was attempted, but he died from the anesthetic and at the autopsy the condition above noted was determined.

CANCER AND OTHER NEOPLASMS.—The most important article which appeared during the year 1906 as far as cancer of the stomach is concerned, is from the pen of W. J. Mayo, *Journ. American Med. Ass'n.*, and details the results which he and his brother, Chas. H., attained in one hundred resections. It is stated that 30 per cent of all cancers occur in the stomach, and the reason that cancer in this situation has not more often been treated radically is that the mortality in early days was extremely high, and further because it is often difficult to make an early diagnosis. The mortality at Rochester has been only 14 per cent, which is in striking contrast with the figures of earlier writers. The Billroth No. 2 is probably the operation which meets the requirements of the greatest number of cases. However, the Kocher procedure is more nearly anatomic, and where it can be used should have the preference. The Mayos had twenty-five consecutive cases with only one death, which is truly a record to be proud of. They found that more than half of their stomach cancers developed in old ulcers, a matter which must attract the attention of surgeons to a new importance attaching to the treatment of ulcer. A radical operation gives more than three times as long life tenure as does a gastroenterostomy, even when recurrence takes place. Only 26 per cent of the 313 cancer cases operated upon by the Mayos were early enough to permit a radical operation. The technique, which Dr. Mayo gives in all its details, must be studied in the original in order to be thoroughly grasped; however, one can never gain an adequate impression of the masterful resection done at Rochester unless he has seen it with his own eyes.

An article on stomach surgery by Robson is always of more than passing interest. Hence, his statements on operative treatment of cancer, published in the *Lancet* for August 18th, must be taken with more than passing notice. He is more than ever positive that an explorative section is alone able to clear up many cases at a time, when an operation can be of permanent benefit. In cases where a radical operation was impossible, he has had only 3.3 per cent. mortality in gastroenterostomy. This statement is astonishing, when taken in conjunction with writings of many continental surgeons, among whom Krause lost 48 per cent of those whom he treated thus. Resection should give as good results here, under similar circumstances, as have the operations for cancer of the breast, uterus, etc., in the opinion of Robson. The mortality of such an operation in his hands has only been about 14 per cent.

The well-known English surgeon, Moynihan, reviews in the *British Medical Journal*, of February 17th, the patients on whom he operated for cancer of the stomach during the eight years prior to 1906. There were sixty-seven of these, and gastroenterostomy was done forty-one times, the new growth being resected in all of the other instances. He advises that this latter operation be made a routine procedure wherever there

is any question as to a choice between the two methods. Twice he had astonishing temporary results, simply from explorative operations. In three cases he mistook an inflammatory mass for cancer and states in closing that cancer developed upon a pre-existing ulcer in about half of his patients.

In the *Deutsch. Zeit. fuer. Chr.*, Bd. LXXX, Bruening presents an extensive article on the question of resection for cancer. The operation as done by his Chef Popert does not differ in any particular from the second Billroth method, as performed extensively elsewhere. It is interesting, however, to note that he drains the upper abdomen with gauze and tubes, and for the first few days after the operation washes out the cavity. With this treatment, or rather in spite of it, his results have been remarkably good, only six out of thirty-two patients dying from the operation. He has, however, no case in which a permanent result can be claimed. The motor function of the remainder of the stomach has been found to be almost normal in every case examined.

An unusually extensive operation for cancer is reported by Childe (*British Medical Journal*, Jan. 27). In this instance two-thirds of the stomach, the anterior face of the pancreas, and the transverse colon were removed. In spite of this most extensive procedure, the patient recovered from the operation, although the author does not give much hopes for a radical cure.

Fuchs reports a primary sarcoma of the stomach (*Virchow's Archiv.*, Bd. CLXXXIII). The disease ran a course similar to that of cancer in every particular. The tumor was located in the greater curvature, and at the autopsy an immense number of secondary deposits were found. The growth had its origin in the sub-mucous layer of the stomach.

An unusual stomach tumor was reported by Delore and Leriche (*Bull. Med.*, 1905, p. 794, Rev.), this being a malignant leiomyoma. The patient presented at the operation about the same symptoms which one would expect from a cancer. A resection was done with good result. In fact, the patient was still well when seen after the lapse of two years. Certainly, it is uncommon to see stomach tumors composed of smooth muscle fibres. The tumor is described as malignant for the reason that it had invaded various layers of the stomach wall.

Sarcoma and myoma of the stomach are exhaustively treated by Yates in the *Annals of Surgery* for October. He observed several such cases while an assistant of Ochsner and writes most interestingly of the same. Sarcoma is so rare that it has not received its due amount of attention. However, one can think it may not be really as rare as we have supposed, in consideration of the fact that almost all stomach tumors are at once called cancers. Three of these cases were operated upon in nine months by Dr. Ochsner. Only 9 per cent. of such tumors produced pyloric obstruction, and, of course, there is no pre-existing ulcer history, this lat-

ter being urged very rightly by the author as a point of diagnostic value. The prognosis seems to be better in sarcoma than in cancer, since the growth is slower and secondary deposits occur later.

A somewhat unusual stomach case is reported by v. Haberer (*Mitteil. aus den Grenzgeb. der Med. & Chir.*, Bd. 16). His patient had presented symptoms of both stomach and intestinal obstruction. The abdomen was opened and a tumor found in the small intestine with glands in the mesentery, also another at the pylorus. In order to short-circuit both of these obstructions, a gastroenterostomy was done, together with an enteroenterostomy between the resulting limbs of gut and in consequence the patient did perfectly well for some months. She returned to the clinic, however, with bile vomiting and the abdomen was opened a second time and the afferent loop of bowel cut in two between the two anastomoses, the gut tumor being removed as a part of this procedure. There were no further symptoms up to the time the article was written. Microscopical examination revealed the fact that this mass, which had been taken for tuberculous, was in reality a sarcoma.

Sheldon reports later details in the November issue of *Annals of Surgery* concerning a case of cirrhosis of the stomach upon which he operated three years ago. It may be remembered by some that the patient's stomach was very thick and contracted at the time of the operation, a condition which has usually been associated with diffuse cancer. However, since gastroenterostomy was done, the patient has remained well and at work for three years, hence, the author seems justified in the claim that this was a benign condition. This makes the eleventh case of its kind in the literature.

In two cases observed by Pinatelle and Cavaillon (*Province Med.*, Nr. 15) secondary tumor growths were found in the dura and the skull after cancer of the pylorus. These observations are especially noteworthy, in view of the fact that such a finding is exceedingly rare.

GASTROPTOSIS.—Eve gives an account in the *British Medical Journal* of April 7th, of five cases treated surgically for gastroptosis. In all of these, internal treatment had practically been of no use. His operation consisted of sewing with silk the lesser curvature to the liver and the greater curvature to the anterior abdominal wall. These cases were examined from one to two and one-half years after operation and all of them were found to have been greatly benefited.

The surgical treatment of gastroptosis received attention at the hands of Beyea in the November number of the *Journal of the Medical Society of New Jersey*. His plan is to shorten the suspensory ligaments of the stomach and in this way prevent kinking at the pylorus, a cause apparently of stagnation. He has done the operation eight times with seven results which are perfect in every particular, some of them years old. The uncured patient was a pronounced neurasthenic when she came to him,

hence, he does not feel at all discouraged by this one experience. He is convinced that this plan should be tried in every case which resists a properly conducted medical treatment, excepting those where there is general splanchnoptosis. X-ray experiments have determined for him that an abdominal binder has no influence in keeping the stomach in its proper position.

INFANTILE PYLORIC STENOSIS.—In the April number of the *Glasgow Medical Journal* there appeared rather an unusual article by Nicoll relating his experience in a large number of cases with the treatment of congenital obstruction of the pylorus. In some of these children he simply dilated the outlet with good results. In others he did a pyloroplasty and of six so treated lost only one through shock. Their ages varied from three weeks to five months. He does not recommend gastroenterostomy in these cases, because usually children cannot stand it, the mortality being above 50 per cent.

Another excellent article on stenosis of the pylorus in infants appeared in the *Annals of Surgery* last July from the pen of Fisk. He states that the dilatation of the organ is usually marked on the abdominal wall and that a hard mass can often be felt at the pylorus. The circular muscle fibers in this vicinity are greatly thickened and frequently the smallest sound can hardly be introduced. He does not believe that spasm of the pylorus is responsible for this condition, but regards it rather as being congenital. He collected seventy-one cases from the literature, which had been operated upon. Of these 53.5 per cent ended favorably. He is in favor of pyloroplasty as the operation of choice.

Stenosis of the pylorus in infancy was completely reviewed by Scudder before the Johns Hopkins Medical Society (*Johns Hopkins Hospital Bulletin*, January). He had had two such cases of his own, one patient being fourteen days old, and the other twenty-four. Both babies were saved, it is gratifying to note.

If any one single lesson of more import than the others, is to be drawn from the work of 1906 in this line, it is that early diagnosis is the all-important matter. In many instances this is not to be attained without an explorative operation. The sooner we convince ourselves of the value and harmlessness of this procedure, the sooner will stomach surgery come into the full usefulness which it is intended to enjoy.

PATHOLOGY AND BACTERIOLOGY.

IN CHARGE OFCARL FISCH, M. D.

As the object of these yearly comments on the work and progress of pathology and bacteriology cannot be a detailed review of the single additions to our knowledge, like in former years the writer's attempt must be in a selective way to deal with problems that, not only in themselves of the highest importance, represent in the work done on them a picture of the trend that research in those branches of natural science has taken during the last year. The detail work has again been of immense extent, more influenced than before by the principles of chemical, physical and general biologic teachings. Pathology and, naturally, bacteriology, begin to lose their systematic character and arrange themselves among the series of branches of science that build up their structure on the basis of experimentation. Morphologic conditions are more and more made the object for orientation and only the starting point for a more intimate understanding of pathologic conditions and processes, to be studied by experimental methods. The idea that pathologic changes, microscopically demonstrated, explain the nature of a pathologic process, the belief that the interpretation of a gross or microscopical picture gives us the total of the nature of the disease studied, has been acknowledged to be illogic and one-sided, as the findings always show only the effect but not the inner stimuli and reactions that lead to it. Description of pathologic structures, and that has for a long time been the task of pathologic anatomy, never can be an explanation, unless the way in which they were brought about can be entirely elucidated. As an instance, the frequent impossibility of microscopically differentiating tuberculous from specific lesions can be mentioned. The section of a diseased tissue gives us a stated condition, that empirically is connected with a disease or change leading to it. In many cases, up to date, the causative relation of the changes to a pathologic process is a conclusion of the character of the *post hoc*, *propter hoc*. Experimental and physiologic pathology are beginning to throw light on these questions; biologic investigations have already commenced to change our views of the intrinsic nature of many infectious or constitutional diseases. The work done in this direction is enormous, but, looked at from the point of view whether a definite basis has been established, seems as yet rather unsatisfactory. The great question of the functional relation to the morphologic appearances of living tissue has not been answered, although many workers, following different lines of study, have conclusively shown that we can hope, by continuous attempts, to solve the riddle. All this is said

to indicate that modern pathology has lost the confidence that it, after its old methods, can scientifically account for the nature of processes of disease, and that an endless effort is necessary to make them understood. In these endeavors, the separation between normal and pathologic conditions disappear, the field is made extensively larger, and thereby more promising.

Even fundamental conceptions on which our whole morphologic and partly physiologic or biologic thoughts are built up, are likely to undergo a revolutionary alteration. This concerns mainly the cell-theory, the teaching that a multicellular organism is built up by or is a composite of a great number of individual fractions, each of them endowed with specific qualities, and in their complex aggregation and interrelation forming the multicellular plant or animal. There is no doubt that the establishment of the cell as a unit, dating back to Schleiden, is one of the greatest achievements of the last century. On it is based all of our deeper knowledge of the life of protoplasm, of life. Our teachings on the function of life are derived from the study of cells, our principal physiologic and biologic and pathologic acquirements are founded on it. The cell, today, reigns supreme as the primary factor in life and death. Its definiteness and easy reach made it a welcome object of a study of the qualities and functions of the whole, of which it was an integral part, participating of all of its primary qualities and therefore representing a true microscopical representation of the complex. Its study is within the limits of our mechanical appliances, while that of the whole, as far as the primary factors of life are concerned, is out of our reach. An organism is composed of cells, and their study will reveal some of the mysteries of life of the organism as a whole. The view is that a multicellular organism is a state of cells, each of them essentially alike, and only differing from each other in the services they render to the state, the organism, thus composing an entity of positive and constant character and life. The sharp demarkation of the individual cells from each other in most cases, the power possessed by the single, isolated cell, to reproduce the whole organism by simple cell-division (very frequent in plants, as mosses, etc.), the exact study of the multifarious physiologic functions of a cell, all led to the opinion that they formed the fundamental elements of an organism, that in the cellular structure we have to look for the possibility of existence of multicellular animals and plants. In other words, cells were, and are today, and will be for a long time, the basis of every study of structure, function and life. This study has furnished us knowledge of an extensity not to be excelled. Though, however, their source of information was not, by far, exhausted, as yet, certain observations and researches revealed conditions that spoke against individuality of the cells; for certain tissues the continuity of the cells composing it was demonstrated and observations in this direction mul-

tiply each year. Plants are known, large and imposing in differentiation into roots, stem, branches and leaves, consisting only of a uniform protoplasmic mass, with a resistant cellulose skin and providing for its mechanical needs a system of rafters and beams, that serve the claims for support and form. Only when the process of multiplication obtains, cellular masses are separated off from the mother-plant, in some of these plants sexual in character, that lead to the preservation of the species. Aside from the question that future investigation may directly show that all cells of an organism are a continuous mass, that we have not to deal with individual cells, but with portions of an organism, differentiated for certain purposes to cells which exhibit their character as portions of a whole by their transition, the one into the other, there are other points to be considered.

A multicellular organism arises from one cell, formed by the union of two cells. From this cell, under normal conditions, the complex organism is built up, constant in form, function and other qualities. The study of the development of lower animals shows that, in the beginning, the division of the egg-cell produces cells of the same type; further on, differentiation begins with the growth of the young organism, indicated only at first, but growing more and more complex with the development. The point to be emphasized is that in an egg-cell a polarity exists, which forces the single cells to arrange themselves in a definite way. This is, of course, only a name, for a quality that we know exists, but cannot explain. The quality exists and pertains to all of the cells formed by the division of the egg. This is well known from many experiments, where the first division cells were separated, and where each of them began to develop a typical embryo. There must, therefore, be, in the egg-cell, a certain quality that generally is transmitted, at first to a high potency, later, as the differentiation progresses, overshadowed by the specific qualities, the functional qualities of a cell in an organism. No matter what *entwickelungsmechanik* will say as to the mechanical influences dominating this phenomenon, that we know are present and can be demonstrated, the fact remains, that under certain circumstances, a single cell of a complex and adult organism may give rise to the formation of a complex new organism. This quality cannot be located; we may look for it in the chromatin, in the germplasma of Weisman and other constituents of cells, the causes, that constantly effect the same results must be somewhere. They lie, as yet, beyond the reach of our thought, but they show definitely that the organism is a whole, that its order and life is not brought about by the coworking of a number of cells, but that the organism simply divides its mass into compartments or departments, each serving a special purpose to preserve life and to preserve the race. That even cells of the adult organism, differentiated, to a degree, that, as a rule, does not allow of a differentiation into other forms, can show such

capacities, is shown by the observation on the transition of cartilage into epithelium. We cannot explain as yet, microscopically or by physical or chemical methods, this process; that it is there cannot be denied.

That there must be an intimate relation between all cells of an organism has been the result, too, of investigations of the regeneration of certain organs and portions after their loss. T. H. Morgan¹ has, after careful and tedious experiments, arrived at the conclusion that regeneration is the consequence of such an interrelation of all cells of a body, that exerts a presiding influence on the whole. That this does not mean the return to the resumption of "vital" forces is clear, and Morgan has suggested an ingenious way in which regeneration can be accounted for on this basis by mainly physical and chemical laws. Of course, he does not insist on the probable truth of his suggestion; it can only be said that analogous suggestions have been made as to the cause of growth of tumors (Ribbert).

And the subject of tumors may begin in the discussion of the work on some theoretically and practically most important portions of pathology and pathologic anatomy. It may be said right here that an uniformity of opinion as to the origin of tumors has not been arrived at. This would be a miracle with the inveterate habit of predilection for explanations, that in a way are out of the reach of exact and conclusive investigation. However, in following up the literature of the subject, one impression must be gained by every reader, that the number of those observers insisting on the implication of normal tissue cells into the formation and growth of a tumor, becomes less and less. Hauser,² the foremost advocate of this view of looking at the growth of a tumor, has repeatedly tried to prove its correctness, but in all cases the opposing side showed clearly and logically the character of the mistake made. By certain pathologists, transition of normal epithelium into carcinoma is constantly reported, with the intrinsic evidence in their reports, that the necessary care in determining the real condition has not been observed. As said above, investigators that have paid special attention to this phase of the question and to the difficulties connected with definitely answering it have uniformly found, that such change of normal tissue into tumor tissue does not occur. One of the main questions in the cancer problem is to the impartial mind settled: tumors grow from the beginning through multiplication of their own substance, destroy surrounding tissue in various ways, but never change it to tumor tissue (Bormann³).

With this question definitely answered, the origin of tumors is the next to be considered. There, too, a uniformity of opinion becomes more and more established, an opinion based at first on a hypothesis suggested by Cohnheim, later on made probable by an extensive compilation of investigations of certain tumors and lately brought in analogy, not to say by proving the identity with certain experiences with carcinoma,

often observed. It is Ehrlich who deserves the praise for calling attention to this point. The objection made to the origin of tumors from misplaced tissue-elements, misplaced in the course of the fetal development, arising at different times of the growth of the fetus and therefore showing various degrees of differentiation and at the same time of capacity of differentiation, that such tissue-elements could not remain intact and able to proliferate till the time of life when ordinarily tumors are observed. Hauser especially objected to this proposition. Histologic investigations of fetal tissue have since established that the occurrence of such misplacements of tissue out of the normal, physiological connection is frequent and occurs rather normally in all individuals, in all organs, and is especially easily found in regions where later these regions prove to be the site of proliferation of carcinomatous growths. The connection with these misplaced masses of cells and the following carcinoma cannot be demonstrated directly. Bormann, as was reported last year, has established, however, that a partly indirect proof of it is that skin carcinomata occur in the greatest majority of cases in those regions, where mechanically the chances for transposition of tissues are greatest and where, on investigation, such displacements can be demonstrated. Bormann's researches have been confirmed by a number of observations, not to be mentioned in detail, since then. The essential point in the question is, that in all cases thoroughly studied, even the smallest, most minute tumors were constantly independent structures and totally distinct from the cells of the surrounding, originally identical tissue. The primary origin of a tumor has never been seen, in spite of the great number of reports, which describe the genesis of a tumor from in some way pathologically changed tissue. Ehrlich has added to this circumstantial proof the consideration of the metastases of carcinoma that appear many years (see Osler's cases of late vertebral metastases of carcinoma of the breast), making no symptoms in the interval between the removal of the primary growth and their appearance. Their growth, certainly, has been a very slow one; they have stayed for a long time in a latent or dormant condition, until circumstances resulting in stimulating their proliferating capacity made them active and destructive. It appears to the writer that this fact is likewise applicable to transposed fetal elements, the proliferative quality of which, after a long time, is proved by a great variety of tumors that cannot be explained as to their origin, other than by fetal displacement. The only other explanation possible would be a metaplasia of cells of a degree for which no similar or analogous observation is known.

From all this it appears that two points about tumor growth are rather firmly established, the absolute independence of the growth from the surrounding tissue and their congenital origin from dystopic fetal cell complexes, representing a series of formations starting according to the stage

of differentiation of the fetal cells, starting with tumors characteristically called fetus in fetu through all gradations to tumors consisting only of one form of tissue. The greatest practical interest lies in the explanation of the so-called malignancy of certain new formations and in the question, what cause is at the bottom of the proliferation of cellular inclusions, often after a very long time, since they have arisen. A definite cause has not so far been found, although we must admit that, in a way, the proliferation is analogous to other processes nearly related to tumor formations. The proliferation of inflamed tissue is tumor-like and sometimes unlimited, inflammatory tumors. The usual return of inflammatory tissue to normal conditions is due to its location in its own soil. The idea, that cells in physiologic normal arrangement do not proliferate indefinitely because they stand under certain restrictive dependence from the surrounding tissue, a point that by Ribbert, Bormann and many others is made strongly probable, for instance by the unlimited proliferative quality of a skin graft, that in its normal location would have remained the same during a lifetime, while transplanted on a denuded surface it will grow, and may be from here transplanted successively on an unlimited number of other denuded surfaces with the same result. The final result would be the production of a mass of epithelial tissue many thousand times greater than the original mass. In its normal location it would never have exceeded its original volume, due to the restricting influence that its interpolation into the working mechanism of a complex structure exerts. Remove this influence by placing the tissue in surroundings not being in physiologic relation to it, it will, if other conditions of growth are given, proliferate and form a tumor. Experiments proving this position are well known and need not be quoted here. The character of the influence is obscure, but, as Morgan has shown, is accessible to investigation. A suggestion is, that it represents some intercellular tension between the portions of a tissue or its cells. The conditions, besides freedom from the normal connections, necessary for proliferation, are likewise obscure, although many observations lead to the opinion that chronic inflammatory changes of the tissue, into which a foreign complex is transposed, form a stimulus. This, at least, is the usual finding in carcinoma; on it Ribbert has laid great emphasis.

The main progress made during the year in the elucidation of the nature of carcinoma was afforded by the study of mouse-tumors. The investigations have been carried on all over the world, mainly in England, Germany, France and in our country. After establishing the fact that these carcinomata in all respects are homologous with those occurring in man, the study directed itself first to the phenomena of transplantation. Except for Bashford's work, all the rest has been absolutely unanimous in the result, that the implanted cancer tissue always only grows by the proliferation of its own cells, and that no tissue cells of the

host are involved. It was found that in mice not seldom a spontaneous disappearance of the tumor occurred, and that the animal afterwards was immune against reinoculation. The results, however, contradicted themselves in many cases, so that final conclusions on the reaction between tumor growth and the normal tissues of the animal were not attempted. All this work has accumulated a valuable material, but material that could not be interpreted. It was Ehrlich⁴ who, in his classic methodical way, attacked the problem. His preparations for it consisted in the collection of a great number of mouse-carcinomata, their transplantation to other mice and microscopic and biologic study. The virulence of these tumors was found to be very weak, so that positive results were obtained only in about two to five per cent of the inoculated animals. It was, however, found that the tumors grown by transplantation and selection gave more takes in the next series, till after a long number of successive transplantations a virulence was reached that resulted in takes in 95 to 100 per cent. Ehrlich, thus, was in the possession of tumors, that allowed with almost mathematical correctness to calculate the results of the experiments made with them. It was found that mice inoculated with a primary tumor without effect, withstood the transplantation of the most virulent tumor. The resorption of the first tissue fragment, therefore, had produced an active immunity, that for a long time persisted. It was found that a normal mouse could be protected against the growth of a virulent tumor by the injection of a pulp of an only little virulent tumor. This important result will be of wide bearing for the future. Another immensely valuable information was obtained by experiments in which a virulent mouse-tumor was transplanted to rats. The tumor grows rapidly, till an acme was reached, then was resorbed or sloughed off. These rats were immune against further inoculations. The most remarkable finding, however, is that this tumor growing at first in the rat with the highest rapidity could be easily inoculated into mice, but not on other normal rats. In mice it grows with undiminished virulence, rats are immune, while with the same tumor from a mouse, normal rats give positive results always. The explanation of this phenomenon could not be the presence of antibodies in the rat, for then the tumor would not have grown at all. Antibodies could not be produced during its growth, because in that case the virulence for mice would have been interfered with. Ehrlich concluded that the reason must be sought in the presence of a substance in the tissue inoculated in the rat, that is necessary for the growth of the tumor. Of course, the evidence that this is not a substance serving the nutrition of the tumor, is the proportion between the bulk of it and the inoculated fragment. The body, therefore, of the rat was a favorable soil for the tumor. That the tumor stopped to grow is due to this substance, sufficient in quantity to entertain the growth up to the time it was exhausted. Therefore, the body of the rat does not con-

tain this specific substance, while in the mouse it is present. This explained the immunity of the rat, the immunity of mice not taking, when inoculated. This immunity is not antitoxic or due to antibodies; it is due to absence of or low avidity for this substance X, that Ehrlich calls "Wuchsstoffe," a substance to produce growth. His name for this form of immunity is atreptic. Ribbert, in 1904, had explained in a very similar manner, that artificially misplaced epithelia in the beginning grew under the stimulus of substances in their protoplasm, but perished as soon as this material was exhausted. That Ehrlich's explanation is not a simple conjecture is easily shown. We know of a number of such "wuchsstoffe," for one of which, at least, their existence is positively demonstrated, for others very probable. While the assertions of Frankel on the effect of the internal secretion of the corpora lutea on the decidual alteration of the mucosa and the imbedding of the ovum are so far only theory, although upheld by findings in suitable cases, and the same the opinion of L. Pick, that the chorion-epitheliomatous proliferation is due to an excessive secretion of lutein, the work of Starling has definitely proved that such relations exist. The mammae of female rabbits that have not conceived are in a state of atrophy, the whole organ containing only a few glandular structures. By repeated injections of the fluid obtained by pressure from rabbit embryos he saw the mammae enlarge and take on the condition found in the later stages of pregnancy.

This substance X must be assumed not to be a specific substance, specific for the assimilation by cancer cells, but a substance for which receptors are present in greater or smaller numbers in all cells of the body, or that the avidity for it exists in all cells, but differs somewhat in the various forms of tissue cells. A decrease of this avidity in the system, therefore, will be in favor of those having the highest avidity; they will continue to grow and proliferate. Ehrlich's ideas were almost simultaneously expressed by Albrecht,⁵ who also attributed the proliferative capacity of tumor cells to their high avidity to assimilative material.

This theory accounts, to a degree, for the comparatively rare occurrence of metastases in carcinoma, although we know that the chances for it are given in any case almost constantly. As the growth arises mainly in the decline of life, where all functions begin to be decreased in intensity, the avidity for nutritive substances becomes less, the high avidity of carcinoma cells will control all of the substance for its actively living tissue. Here the utilization is most intense, and the cells swept away by the lymphatics or the blood channels will not receive sufficient of it to proliferate actively. An interesting evidence for this is the demonstration made by Harland,⁶ that macroscopic metastases in mouse carcinoma are very rare, but that on microscopic examination the lungs, for instance, are full of capillary emboli, consisting of cancer cells. Cases with macroscopically visible metastases are very rare; one of them came under

the reviewer's observation, with an immense adenocarcinoma of the left anterior breast and many pulmonary, large metastases, some the size of a pea.

A very remarkable result of Ehrlich's researches is also, that active immunity is produced by carcinoma cells, not only for different forms of cancer, but also for sarcomata and even for a malignant chondroma. While there exists a specificity for the species, the explanation is most likely the fact, that tumors arise from cells out of their normal relations, and that under those conditions their avidity or the number of receptors for the substance X is increased. This does away with the attempts so far made to use for specific treatment of cancer only material derived from the same tumor, whose bearer is treated, or from a tumor of the same character and location. Clowes⁷ has asserted that in animals with a spontaneous recovery from tumor, the serum is antitoxic or cytolytic, and that its injection prevents the "take" of an inoculation with tumor tissue. His observations are not conclusive, as he worked with tumors of uncertain virulence. Ehrlich rather thinks of the production of an active, not an atreptic immunity by the use of material from a tumor of little virulence.

The further study must show how these researches will have a bearing on human cancer. One fact is certain, that mice can be protected by active immunization against inoculation of cancer-material—that is positive in normal mice. There is no doubt that this fact means that it will only be a question of time when it will be applied for man. Aside from the practical side of this work, it has thrown light on many biologic problems that so far have been considered as inaccessible. We have a firm basis now for the study of the general, that means biologic nature of tumor formation. Whatever the origin, Ehrlich has shown that they can be demonstrated to be different in physiologic qualities from the normally arranged tissue cells. That we have to deal in them with something independent from the normal interrelation of the functions of an organism. The proof for this is that it is possible, at least, for one animal to control this interference with normal conditions. Experience tells us that such a demonstration must finally result in the successful use of the method in other organisms with absolute identity of the character of the interference. What this substance X is, is not known; the demonstrations of Blumenthal,⁸ that in carcinoma tissue, enzymotic bodies are present, not demonstrable in normal tissue, may be a starting point for experimental investigations to characterize the nature of the substance. One thing is certain, that Ehrlich has made it possible to attack cancer problems in a definite direction, the experimental results are convincing, and the point is by further investigation to arrive at a clear insight into the correctness of his interpretation. It may be that the final explanation will be of different character, nevertheless, his results will, whatever their

final explanation will be, be of immense value for mankind. At least the protection against carcinomatous invasion will be accomplished in a reasonable time. As to the dealing with the established condition, the outlook is possibly also made more favorable. As to greater facility of these studies, that took Ehrlich years of continuous work, a paper must be mentioned by Beebe and Ewing⁹ on the so-called infectious lymphosarcoma of dogs, a typical tumor, that with ease and great certainty can be transplanted, and, that as far as present knowledge goes, produces by spontaneous disappearance and by the injection of attenuated tissue an absolute immunity. Another publication by Sticker,¹⁰ on a similar tumor, also in dogs, makes the contact infection from individual to individual a certainty. It is a tumor acquired during coitus; the primary lesions correspond always exactly in their location in vagina and penis the points of contact. Several interesting results have been the outcome on the experiments with this tumor. The reach of our ability to experiment has thus been greatly increased and a new era of tumor research has begun. The coming years will bear rich fruit.

While for the tumor question a definite progress can be stated, that we, with our human capacity, must consider as working in the right direction, the other most important, because most widely spread, pathologic process, the tuberculous infection, has, in spite of immense work spent on it, remained this year the object of the bitterest discussions and fight. On the principal sides of the problem no uniform opinion has as yet been found. Even experimental investigation has led, in most cases, to absolutely contradictory conclusions. The origin of the human infection becomes more and more unanimously accepted as human. For several reasons the fear of the bovine virus is still maintained and preventions against the rare possibility of infection from this source are still advocated on a large scale. The observation, that the origin of real cases of bovine tuberculosis could mostly be traced to the intestinal tract, made bovine bacilli in milk and other foods for many a danger greater than the contact with the human tuberculous individual. Behring's assertions have raised an attempt to verify them, and there is no doubt that the result, apparently, has been confirming, as far as the methods used were understood in their character. Especially the French school, under the guidance of Calmette's¹¹ work is today maintaining that almost every pulmonary infection arises on the way from the intestine to the lymphatics and from there through the blood to the pulmonary capillaries. Uffenheimer's¹² experiments have seemingly shown the same thing. The objection from the other side is, that with the frequent absence of tuberculous changes in intestine and mesenterial glands, such a possibility could not be thought of, because tubercle bacilli cannot enter without at the point of entrance to cause tuberculous changes. It is mainly Baumgarten that strongly insists on the necessity of demonstrating such

changes before the explanation can be considered. After all, it seems that the latter author is not quite sure of his statements, as certainly other substances, foreign bodies and bacteria, can be resorbed without causing disturbances into the lymph-channels and deposited in the regional glands. Anthracosis of mesenterial glands is just now discussed with great fervor, the inhalation theory condemned and resorption of the pigment by the intestine maintained. Here, too, no final word has been spoken, just as little as about the passing of tubercle bacilli without causing lesions of the intestine. That the methods of proving by experiment the one or the other eventuality are not, in spite of the greatest precaution and the most original devices, conclusive in their results, has lately again been shown. The introduction of infectious material into the stomach can, perhaps, be done without depositing any of it in the mouth or pharynx. Careful experiments, however, have shown that the bacteria ingested are, under certain conditions, carried upward, and not downward. Injection of the material (*bacillus prodigiosus*) into the rectum shows in a short time this organism present in the stomach, mouth and nose. From the latter surfaces they enter the trachea and are found in the lung tissue. The consideration of this fact makes the direct penetration of tubercle bacilli through the wall of the intestine, without causing lesions, at least doubtful; the subject has to be put under the most close scrutiny before it can be used as evidence. It is true that there is pathologically a different histology to the lesion, whether produced by the infection through the circulation or by introduction through the bronchial tract. Calmette asserts that early pulmonary foci always bear the character of capillary origin, while artificially produced lesions by inhalation give a different picture. The truth is, that the earliest lesions only exceptionally come to our notice and can be examined, while it is impossible to draw from an advanced tuberculous product any deduction as to its origin. The perfect freeness from tuberculous changes in intestine and lymphatics in the majority of cases of pulmonary tuberculosis, almost forces to the opinion that in them the virus has come the way from above and not from below. Of course, these discussions, as far as practical results are concerned, are of no importance, as the introduction through the mouth or nose will remain always the way the invasion takes place. The decision for the one or the other will not alter the measures, attempting to prevent infection. In this respect it is important to mention that the quantity of virus necessary to bring about a dangerous infection is considerably larger, as that it could be caused, if only an occasional contact occurs. At the best, such a contact will make a small focal change, that, by the natural powers of defense of the organism, is sooner or later eliminated. In this light the meaning of the immense morbidity of tuberculosis must be considered (95 per cent), if it is compared with the mortality (7 to 10 per cent). If we were able to go into

the life history of a case of established tuberculosis, the result will always be the demonstration of a close contact with a tuberculous subject for a long time and continuously. Animal experiments (guinea-pigs the most susceptible of all) show that a certain number of bacilli must be inoculated in order to lead to a fatal infection. Very small numbers cause either no reaction or only such slight changes that the resisting power is sufficient to deal with it. The way of protection, of prophylaxis is given. It will not be done by the health board restrictions and isolation and disinfection, nor by sanitarium treatment, that, by the way, already has proven its insufficiency in fulfilling the hopes entertained for it; it will be done by better education of the public and mainly the profession, to learn to diagnose tuberculous infection before the bacilli can be demonstrated in products of destruction. This can be done; that it is not done is a crime. Koch, himself, has expressed himself in similar terms in his last lecture in England. The tuberculin reaction must become one of the routine measures of medical men. Through a method that later will be touched, even without the inconvenience of the tuberculin test, certainty can be obtained. It is due to Wassermann's work, that this is made possible. Pathology and bacteriology are able to deal with tuberculous infection of mankind, as it already does in cattle. Medicine must utilize this result and not waste time, work and chances in enthusiasm about registration, disinfection and sanitarium treatment. Intrinsically, this is the view of all well familiar with the pathologic and bacteriologic character of the tuberculous infection.

In other directions the problems of pathology and pathologic anatomy have comparatively little advanced in clearness and elucidation. The single items show that the detail work still dominates. It is directed, however, more and more by the attempt at experimental proof than by that of accumulation of identical findings and the drawings of conclusions from this on the nature of the process studied. For instance, the nature of liver-cirrhosis has been assumed to be a secondary consequence of damage to the liver substance itself; it must be admitted that the reasons for such causation can be, to a degree, suspected from the histologic character of the lesions produced. In spite of innumerable attempts to directly prove the correctness of this explanation, the results were more or less doubtful. Beebe,¹⁸ in occasional findings in animals used for the production of antitoxic serum, found liver changes suggesting a process similar to that observed in human cirrhosis. This led to experiments with the injection of hemolytic serum into animals, to watch the effect as to changes produced in the liver. The result was a positive confirmation of the ideas entertained about the process going on in human cirrhosis. There are slight differences to distinguish the first from the latter, but the result proves definitely that cirrhosis is only a secondary phenomenon, and that the primary factor is a damage wrought by toxic

substances acting on the liver cells themselves. By this work the study of the etiologic factors in the disease is generally simplified and made accessible to experimental investigation.

The subject of arterio-sclerosis, too, has played a great part in the late experimental pathologic researches, on account of the observation that the intravenous injection of suprarenal substances (adrenalin) caused in animals lesions, especially of the beginning of the aorta, in many respects suggesting the picture of arterio-sclerosis in man. The observations for themselves are of exceeding interest, showing the effect of an intoxication leading to a specific histologic change of the vascular structures. Closer study, however, revealed that the changes caused by adrenalin in animals only resemble arterio-sclerotic lesions that histologically are widely different from them. (Pierce and Stanton¹³). So far, there is no material on hand to show whether the therapeutic use of adrenalin in man causes analogous changes in the blood-vessels, and the studies must be for the present considered as interesting and important, but not as yet proved to have a bearing on pathologic processes in man. They prove, however, how little we are aware of the many biologic effects that are exerted by certain substances produced by our organism in organs, the meaning and physiologic action of which is mysterious or only guessed at. The therapeutic action of adrenalin is not known in its nature, nor is it known what action it has on the maintenance of the equilibrium of the organism. The great material so assiduously collected by Sayou in his great work, is only suggestive, but in no way and in no particular point conclusive. The investigation, experimentally conducted, on the effect of adrenalin on the circulatory structures, must be pronounced, therefore, as very valuable and necessary. Adler and Hensel have produced similar lesions by using nicotin.¹⁴

In most of the other pathologic questions the progress has been very slow and even doubtful. In most of them, so far, the microscopic establishment of facts is the prime object of work. This is especially the case when it comes to the discussion of the nature, origin and relation of the different cellular formations of our body, called white corpuscles. As far as microscopic investigation can go, the general consensus is the correctness of the teaching of Ehrlich, that the so-called granulated and not granulated elements of the blood are derived from different sources and have no direct connection with each other, while others, following Pappenheim's ideas, assume a common origin for both of them. With the difficulty of differentiating by staining reactions the various elements under discussion, especially with drawing from certain staining reactions conclusions of affinity and identity, all this work has only a relative, subjective value. This obtains, too, for an extensive publication of Dominici,¹⁵ based on

many careful investigations of the haematopoietic tissue, but neglecting the fact that single observations with the great variations of personal equation cannot be made the criterion for general conclusions. The truth is, that knowledge of the specific qualities of the haematopoietic tissues of the animal organism is today as scanty as it was before. Objective microscopic investigation still holds as the most probable interpretation that given by Ehrlich. The same obtains in the interpretation of changes in the lymphatic structures, the impossibility to obtain clear ideas about the relative value of differences occurring in their pathologic alterations has not been overcome, and, therefore, even today, any designation of changes with a specific title must be considered with suspicion. A valuable consideration of this inability to attain reliable points of differentiation has been given lately by Seelig.¹⁶ His careful studies of the character of the so-called reticulum in lymphosarcomata and round cell sarcomata has not even here proved of differential value.

Other problems of special pathology, so for instance the Langerhans-Island-diabetes theory have had their share of work that, unfortunately, leaves the question open as before. The latest extensive and thorough work of De Witt¹⁷ concludes again with the probability that changes in these structures are causative of diabetes.

Ribbert has promulgated an anathema on the habit of calling inflammatory changes a method of protection, that is said to be anthropomorphic and has no place in biologic considerations. He applies to inflammatory changes the effect of the disturbance of the physiologic interrelation between adjoining cellular structures, that, as he has pointed out, conditions the normal arrangement and function. The act of inflammatory proliferation depends only on the disturbance of this relation, the severance of the connection, that in all cases will and must lead to proliferation, until a status is obtained, in which normal relations are restored and the mutual influence of the structures re-established. Ribbert's view is certainly correct, but he must admit that, talking of protective purpose of inflammatory processes, we have used only a language that was expressing more the practical consequence than the theoretic aspect of the phenomenon. Ribbert's paper is, however, characteristic of the trend of thought that begins to prevail in the interpretation of pathologic processes. There always has been and still is too much of antropomorphism in it.

Mallory's work on fibrillae of connective, muscular and neuroglia tissue has been sustained by the establishment of very similar structures, or epithelium, in normal or pathologic conditions. Thompson¹⁸ has published a paper that demonstrated such fibrillae in and between the cells, and he subsumes, under this title, the well-known bridges between them (prickle cells). The work is certainly a valuable ad-

dition to our histologic knowledge, but, so far, it cannot be said that it has opened new views. We know nothing of their origin or function, although it is very probable that they are products of the cells. They can be stained only by specific methods; that these methods obtain for all of them, does not prove that they have all the same character and meaning. As they are always present in some normal and pathologic conditions more than in others, as they occur in all classes of vertebrates, they cannot be without some meaning for the functional qualities of the tissues in which they occur. What their qualities are, what the relation of fibrillae, for instance, is to connective tissue fibres, we do not know. The delicacy of the method by which they must be demonstrated, makes a general study very difficult. The necessity of using only very fresh material, is an obstacle that often, possibly, cannot be overcome. These fibrillae add to our conviction that histologic methods, so far, have not revealed to us but a small portion of the real structural composition of a subject. And in addition to this, we never know to a high degree of certainty whether the stained objects represent conditions existing in the living state, or are the products of artificial changes of the material, that are the condition *sine qua non* of histologic studies. In this line, too, a decided progress can be reported, as lately the examination of living tissues has been recognized as a method that, under certain circumstances, will yield more correct information than the most delicately stained specimen. The ultraviolet microscope will be of great help in the study of living material.

It would take many pages to continue to refer to work dealing with subjects for themselves interesting, but not of general bearing. In many, exceedingly interesting results have been obtained, for instance, the problem of the process in which calcareous deposits are formed or the changes taking place in the transversion of cartilage into bone, or of connective tissue into cartilage and amorphous calcareous or true bone tissue. The remarkable metaplasia obtaining in these phenomena is of great importance for problems of much wider reach, as mentioned in the beginning of this review. The subjects dealt with are so diverse in nature that too much space would be needed to present their meaning in a proper form.

As leading over to the progress of bacteriology, so-called, that in reality is today simply a part of general biology, the bacteria playing only the part of a factor in the biologic problems, it may be recalled that the pathologic effect of toxic and immune substances on normal tissues has been extensively studied, and that in some cases the results were such that important conclusions could be made for the solution of problems of practice. Beebe,²⁰ by demonstrating the toxic effect of hemolytic sera on liver cells, has opened a field of research

of a wide extent, and he also has, by the investigation of certain specific nucleo albumins, allowed of the prognosis that toxic action can be recognized by definite pathologic and histologic changes. As yet, the subject is still in its infancy, but it has been inaugurated in a way that much hope can be entertained for important developments in the near future.

As to bacteriologic work done, all of it can be separated into two classes, the first that deals with bacteriology as such, that means with the morphologic, biologic and developmental qualities of these organisms, not to mention the attempts to arrange them systematically in the so-called natural relation to other microorganisms. This class is omitted here, because whatever of it reflects on the second class will be utilized. The latter attempts to achieve intimate knowledge of the relation and effect of bacteria on the life and health and disease of other organisms. For our purpose, we have only to consider that side of the task that deals with health and disease of animals and men. Two important sides of the problem are those that establish the causation of infectious disease by bacteria and other microorganisms, and on the other side those that try to find an explanation for the way in which the microorganisms do their work, and in what way we can create obstacles, preventing or changing their effects. Both of these tasks have been carried on and advanced considerably during the last year. The first not so much for bacteria, but for other microorganisms.

New in the list of disease-producing bacteria is a bacillus discovered by W. Ford Robertson,²¹ in cases of general paralysis of insane (dementia paralytica). The organism, called bacillus paralyticus, is said to be at the basis of the tremendous mortality from this disease. It resembles a diphtheria bacillus, can be cultivated, and is pathogenic for rats, but not for guinea-pigs. The symptoms produced in rats correspond in some way to those seen in human paralysis, especially those during the final congestive attacks. They are found in the intestine, bronchi, nose and ear, and are present in the urine. They are demonstrated in the cortex and in the meninges. From blood they have also been isolated. Robertson discusses, in all details, the reasons which lead him to pronounce this bacterium the etiologic factor of general paralysis. It is very difficult to criticise the paper, as long as no other observations from other investigators have been forthcoming. The facts in the case are these, that the bacilli are present in great numbers and seemingly in pure culture in the organism of a paralytic, they are present especially in the cerebral lesions. Experimentally, they have produced in rats and goats a fatal disease, that from the description given certainly may be analogized to symptoms in human paralysis. Before anything definite can be said, other

researches have to confirm Robertson's report. Pathologically, it seems that a reactive activity of the body, as shown by the presence of certain immune substances, is very suggestive, although alone not conclusive. The work will stimulate wide research, and in due time receive its verdict. A priori, the possibility of such a causation of paralysis cannot be denied, although to the bacteriologist it appears an unusual deviation from the habits of diphtheria-like bacilli to appear in the blood and to cause lesions of the internal organs by intoxication. The fact that they are only with difficulty demonstrated in the organs, appearing mostly as forms of involution or degeneration, is somewhat suspicious. That they are passed with the urine is also a suspicious phenomenon, as this would mean a constant septicemia. If Robertson's conclusions prove to be true, he will have done a great work. For the present, any meaning expressed for the pro or contra is not justified. Impartial control investigation has to be done.

Other new pathogenic bacteria have not been found. The fight about the pertussis organism is waging as before, and today we have about six different organisms, whose fathers claim that only their own offspring is genuine. Great importance may be attached to the extensive studies on anaerobic bacteria, as causative factors in many obscure conditions, and especially suppurative processes of the osseous system and the intestinal canal. The methods for isolation and cultivation have been greatly improved and facilitated during the last year, especially by French bacteriologists. Definite results have not been achieved, although it has become very probable that many obscure disturbances of the intestinal tract in infancy are due to the work of anaerobics. Their symbiosis with aerobic bacteria in certain infections and their pathologic character in the latter also begins to be the subject of study.

As to the rest of pathogenic bacteria, the methods of demonstration and differentiation have not changed much. That the cultural and microscopic findings have taken almost a back seat is due to the much more specific reactions that these bacteria or their products give with the body-fluids of an infected organism. The final decision, today, is always only based on them. For the different forms of dysentery bacilli, their study has resulted in such a complex condition of these reactions, that even Park considers it one of the most difficult tasks to be performed. Further details about this side of the progress of bacteriology would be of very little general interest. This is more attracted by the investigation of the reactions between a parasite and the infected organism. Ehrlich's principles still obtain and are the guiding star in all the later observations. Whether their basis is true, whether perhaps their theory is true, we do not want to discuss here at this time. The fact is simply this, that everything that has been

done to effectively influence infectious diseases by specific reactions is based on Ehrlich. His theory has, at least, again proved practically eminently valuable. In the first place, under these applications of it, stands the study of the meningococcus of cerebrospinal meningitis, made by Flexner.²³ He has been able to open the way that this disease will be in the future controlled by the reactive products of animals artificially infected with the organism. The definite character of this agent is not quite apparent, but its effect has been established, at least, for animals. His experiments on the other side, have furnished an illustrative example of the danger that lies in conclusions drawn from observations during the course or after the end of the disease. He has demonstrated that in this form of meningitis, the organism injected into the spinal cord appears in great abundance in the nasal cavities. The occurrence, here, has so far always been considered as the port of entrance, while it most likely is only secondary. For dysentery and pneumonia, specific sera are prepared. Kraus,²⁴ in Vienna, claims even to have found a dysentery antitoxin. That he has not to do with a real antitoxin, just as little as Calmette's antitoxin for typhoid is a real antitoxin, is clear. The effect of his serum that seems to be established is rather due to specific substances, acting only under certain conditions of the infected individual by bactericidal effects. Wherever this effect cannot be brought about by the incapability of the individual to produce antibodies, the serum will fail. In the cases with sufficient vital energy, the stage of the disease in which the serum is administered is the factor that decides about a beneficial effect. Calmette's serum cannot act beneficially on an organism at the height of infection and endotoxin intoxication; it can only do good at the beginning of the infectious process. The production of antitoxin by bacteria with a totally bactericidal reaction and a consequent production of antitoxin is nearly absolutely excluded by the whole clinical picture of the disease. The antitoxic serum for anthrax of Sobernheim belongs to the same category; a real toxin production by this bacillus has never been established. A bactericidal serum—what all of these sera are—will only act, cutting short the infection by killing the infectious agent at a time when their number has not increased to a degree that the total amount of endotoxin resulting from the disintegration of the number of bacteria present will form the dose fatal for the organism. The latter can never be determined in man; in animal experiments this has been shown to be the state of things. The announcements, therefore, of sera, known to be produced by bacteria not secreting a soluble toxin, but only acting intoxicating by the destruction of their body and the resorption of the products of this destruction (endotoxin) by suitable receptors of the infected organism,

must always, *a priori*, be considered with suspicion. The investigation of the true character has always established the above sketched relations. The hope to prepare sera for the cure of well-established infections of this character that means neutralizing a toxin that is not known, is, on general principles, *a priori*, futile. Only in rare cases, the pyocyaneus and the botulismus infection, such conditions have been positively established. For typhoid, dysentery, plague and others, no data are known, that only allow to think of such a possibility. The trend of scientific thought, therefore, has been during the last year, not even to go to the trouble to contradict such apparent results, but to leave their fate to the practical application and the necessarily following failures.

The hope that all infectious diseases were amenable to treatment with specific substances, like it has been established for diphtheria, tetanus, pyocyaneous infection and botulismus, has only been entertained by men not aware of the incontrovertible facts obtained by scientific investigation for other diseases. Our whole knowledge of immunity reactions is based on this point. Its truth is, at least, practically shown by the results obtained by their application.

As to the theory itself, no change has taken place during the last year that would indicate that it is a failure. On the contrary, it has led to a widening of our means to scientifically recognize the presence or previous existence of infectious diseases, that by other methods could be done only empirically by comparison or experience or statistics. This is due to original work first done by Bordet, years ago, but not recognized in its intrinsic importance, and then firmly founded and elaborated by Moreschi and Pfeiffer and put to application for practical purposes by Wasserman and by Neisser and Sachs.²⁴ It is a method that, by means of a combination of immunity reactions, too complicated to be detailed here with any benefit to the reader not conversant with the subject, gives even with the minutest amount of immune or toxic substances a reaction so palpable and so definite, that if the proper precautions are taken, no mistake is possible. It is possible with this method to demonstrate almost infinitesimally small traces of proteids, of antigens and of antibodies. The specificity of these reactions is fully established by an endless number of control experiments, made since first the method was made known. By this method we are able today to determine, in obscure conditions, the existence of tuberculosis, syphilis, glanders and other chronic diseases with a definiteness that has been borne out by the most scrutinizing control. The procedure is the most definite evidence for the remarkable extent to which specificity of organic substances goes, and that even exceeds the limits which are set to physico-chemical methods for acceptable conclusions. The specific-

ity of these reactions of minute amounts of material is so remarkable that we are at a loss to account for them. The relation between the quantity of substances influencing the reaction and the physical effect produced is so startling that no handy explanation can be given unless we resort to the basal conceptions of Ehrlich's theory. On these principles the method has been developed, showing the fundamental correctness of the conceptions which he established. The extent to which this method will influence our diagnostic, prognostic and prophylactic measures cannot be determined at the present. For sanitary, hygienic and specifically medical problems, it will be of the utmost importance. Wasserman and Plaut,²⁵ for instance, found that, by its application in the majority of a great number of cases of general paralysis, the presence of antisyphilitic substances in the blood could be proved. The general trend of opinion is, that tabes and paralysis are late or post-syphilitic conditions, although the researches of Robertson, reported above, would contradict this. The point in this question would be to determine whether in individuals, recovered from the infection and not showing paralytic symptoms, these same antisyphilitic substances will be found. The authors are very careful, on this account, to draw definite conclusions. By this method it is possible to diagnose an obscure chronic infectious condition, where other means have failed entirely to definitely establish its etiology. The differentiation of the origin of blood and of other proteid material by this method is finer and more convincing than by the original precipitin reaction originated by Bordet, generalized by the reviewer and by Wasserman, and applied for practical purposes by Uhlenhuth.

As to the treatment of and vaccination against infectious diseases, nothing very important has developed during the last year, methods are more refined and the indications more definite. No antitoxins, except those for diphtheria and tetanus, are today used for preventive purposes. It is true that we hear, in the literature of France, about an antitoxic serum against typhoid (Calmette), in Austria about such a serum against dysentery. The toxin prepared for the immunization of serum-giving animals have nothing to do with the nature of the real toxins; they belong, most likely, to the endotoxins, for which, on account of their structure, no antitoxin production can be imagined. The sera of Calmette and Kraus have the character of bactericidal sera, the limit of the utilization of which is well defined and understood, as explained above. The evidence brought forth for the antitoxic nature of these sera is not conclusive. They can only be employed as vaccines or in the first stages of infectious diseases—never when the picture is fully developed. Wolff, in many publications, has clearly stated the experimental data that obtain, and that

make it a futile attempt to prepare antitoxic sera by means of bacteria, fatal by their endotoxin, that means the destruction of their body intactness.

As to Ehrlich's theory of immunity reactions, the status is the same as last year. While on the one side much and important material has been accumulated again by the influence of the ideas of this author and bearing on them, there is nothing that adds new features to the great structure. It has lost very little of its dominancy, and is even by enemies pronounced so far the only method to penetrate into the depth of many biologic processes. How valuable it is when applied to structurally altogether different problems. Ehrlich himself has shown by his studies on tumors. The antagonists, especially in physical chemistry, have not been able to refute the objections that on theoretic principles must be made against the explanation of immunity reactions after mere physico-chemical laws. The enthusiasm for the colloidal theory has greatly subsided, while the study of colloids, as such, has so far not brought results that allow of a clear understanding of their physico-chemical character. Altogether, the steps in arriving at what the truth is, have not advanced, and Ehrlich's words reign, like before, supreme. They will certainly be supreme for a long period to come.

An important addition to our views on the relation of bacteria to the organism, which accounts for obscure problems in certain infectious diseases, such as streptococcus and pneumococcus infections, is the opsonin theory, and during the last year this theory has been worked upon very exhaustively both in Europe and in this country. Mallorek, in his studies on the action of antistreptococcus serum, had come to the conclusion that it must consist in the stimulation of the phagocytes, causing a more active phagocytosis than normal serum could do. As no bactericidal or antitoxic qualities of such a serum could be demonstrated, nevertheless its action could experimentally be proved; this explanation was accepted, at least, in France. No explanations of the nature of this process were attempted, except that leucocytes were directly influenced by such an immune serum. It was only two years ago that the study of this question was extended. Almost simultaneously, Wright in England and Neufeld and Rimpler in Germany came to the conclusion, from their experiments, that the cause of the phagocytosis was not a stimulation of the leucocytes, but the presence of substances in the serum influencing, in some way, the bacteria so that they could become a prey of the phagocytes. The character of this process was first definitely established by Neufeld, who found that the substance acting on the bacteria was a definite body with qualities analogous to other immune bodies; he called them bacterio-tropic substances. Wright came to the same result,

independently, studying the reaction in normal and pathologic blood, and impressed with the apparent importance of the process, attributed to it one of the main features in the process of infection. His name for the bodies is opsonins—a name that has been generally accepted. From the extensive work that Wright and his followers have done, there can be no doubt that opsonin-action plays a part in the course of infections; Wright and others have made it the basis of therapeutic procedures, guiding their way by the establishment of an opsonic index, taken from a great number of experiments the average of opsonins in normal blood. The variation of this index in pathologic conditions is the direction for the application of specific treatment. The theory has been worked out to a complete system, and the results obtained from its practical use are apparently confirmatory. While there is no doubt that opsonins exist, and that they have perhaps an important function in keeping up the normal protective powers of the body, this role has not been definitely established. What the object of phagocytosis is, is not clear; whether it means simply a scavenger service, or directly a destruction of dangerous material, is not certain. In all of the opsonin investigations, no regard is taken of the varying virulence of the infecting bacteria, nor has any attempt been made to penetrate into the character of the change that bacteria undergo under the contact with the opsonins. That a combination of the two takes place is certain; absorptive or binding, we do not know. A great drawback to the exact demonstration of quantitative proportions is the method that depends upon so many factors, some not understood and only empiric, others influenced by the personal equation of the observer. This will not detract from the admiration which Wright deserves for the enthusiasm with which he has opened this new field of research and knowledge, but for it, too, the conclusion is that it must be capable of exact quantitative methods. It is very likely that this will be done soon, and that probably Wright will be, in a way, what Ehrlich has been to other immunity problems. Science will not be satisfied, however, until these exact methods have been found, and have confirmed Wright's conclusions. Opsonin work will be the leading trend of work for years. For literature on the subject, see Hectoën³² and Potter.³³

As to the aggressins that Bail claims he has discovered, the work of Wassermann has shown that they do not exist, and that the aggressive effect of fluids due to an infectious process is caused by the death of many of the infectious bacteria and the production thereby of endotoxins. Added to a living culture of bacteria and inoculated, this endotoxin will increase the toxic effect and cause the inoculated animal to succumb sooner than the bacteria alone would do.

To give even a short review of the work done in the study of protozoic diseases, would call for as many pages as this whole department can afford to take. It would involve the detailing of the investigations into protozoic diseases of a great number of animals, only some of them important as to their relation to the human race, but all of them in themselves equally fascinating and theoretically important. The amount of work done by English workers on different diseases in their tropical possessions is immense. In many of them the main factors of the diseases have been established, and the point where they all of them fail is the finding of specific means to fight against them. As all of these diseases in their transmission and existence are the consequence of an intermediate host of the contagium, the difficulties in the attempt to find means to control their ravages are very great. It takes a long line of patient observation to get a clue, and it is one of the best proofs of the ingenious originality of Robert Koch, that he, in some of these protozoic diseases found out the intermediate host and devised means as to how to protect against its dangerous attacks of man. By his studies the danger of recurring fever in man, caused by the bite of ticks that have fed on another recurring fever patient, the possibility is established for the prevention of such a contact. The same obtains for that fearful infection called sleeping sickness (*trypanosoma gambiense*), due to the transmission by the bite of a fly nearly related to the tsetse fly that causes millions of loss in the raising of cattle in South and East Africa. The same obtains for the pest raging in certain portions of South America, and making the raising of horses almost impossible (*a trypanosoma gambiense*, like that of the cattle disease of Africa and India, Surra and Nagana). For all of these, the way of transmission has been established through investigations so multifold that a detailed mention of the contributions is impossible. The literature on this subject of *trypanosoma gambiense* and *spirochaeta* diseases is so voluminous that it cannot be detailed here. The *Journal of Tropical Diseases* is a source in which reference to all of these diseases is easily obtained. Very similar protozoa, *trypanosomata* and *spirochaetæ* are at the bottom of human diseases. One was mentioned before. The relapsing fever, so long known as being characteristic by the blood carrying, at certain periods, *spirochaetæ*, has been investigated as thoroughly as never before by Novy.²⁶ His results as to the dealing with the disease are very interesting and perhaps important, as he was able to demonstrate the possibility of producing antitoxic substances against the action of the parasite. Owing to the unusual facilities he had for experimentation, his work on the *spirochaete obermeiri* stands foremost in any investigations of the disease. He has established that protection is possible, and that it

needs only financial resources and experienced workers, to prepare sufficient serum that prophylactically and even curatively will control the disease. His experiments and conclusions are very convincing, but they lack the spirit of those methods that have established our modern conceptions of immunity processes, where every step was controlled by the most scrutinizing and exacting control investigations. The relapsing fever is ascribed to an organism called a spirillum, considered as a form of the class of bacteria. Many forms of this character have for a long time suggested that they, in many respects, greatly differ from the characteristics of bacteria. Their cultivation has been impossible, and their whole course of development was a mystery, so much so that Turncliff²⁷ last year was led to assume that (fusiform) bacilli could change into spirilla or spirochaetæ. That her conclusions do not bear the criticisms of control investigations has been shown by Mühlens²⁸ and others, who finally succeeded in cultivating spirochaetes (especially the spiroch. dentium) in pure culture under anaerobic conditions. Altogether, spirochaetæ behave in their biologic qualities different from any form of bacteria known. Their spirillar form is not due to a spirillar arrangement of chains of bacillar portions, but they are single individuals and not chains of individuals. The method of division or multiplication is not established with certainty today; that they multiply by transverse division like bacteria, is very unlikely, in spite of the assertions made by Novy in this respect. Even if the division should be transverse, it would differ entirely from that of bacteria, by leading to a thinning out of the organism, and finally to the attachment of two cells to each other by only a very thin filament. Such conditions do not obtain for bacteria, where the division is transverse, from the beginning to the end, a form of division that has given them their special place in the system of lower organisms. The statement that the tapering at the opposing ends of two spirochaetes is due to transverse division is not tenable, because a spirochaete dividing along the longitudinal axis will, under the conditions given by the examination, entirely assume the aspect of two different individuals about to separate from each other, after having been produced by a transverse division. The detail observation shows not so rarely spirochaetæ that consist of two branches, having the same number of turns, and of a thick continuation consisting of only one spiral, that generally becomes thinner, where the two branches join. The whole picture, with the difference in thickness between the divided parts and the not-divided rest, is so clear, and the absence of any evidence of the union of the thinner branches to the thicker end of the formation so definite, that the impression of a longitudinal division cannot be suppressed. That spirochaetes multiply in the way bacteria do, has by no means been estab-

lished by Novy's observations, and it needs further study to finally determine this question. In spite of Novy's positive assertions, we cannot accept as proven the bacterial character of these organisms. Prowaczek's²⁹ work on certain forms is highly suggestive of a complex-cycle of development; the study of Mühlens' cultures has shown definite points indicating a multiplication by longitudinal splitting.

In regard to spirochaetic etiology of syphilis, the last year has brought an amount of work astonishing in its extent and explained by the great importance of this disease on human health and welfare. With the exception of a few childish and ludicrous contradictions (Sahling, Schulze, Sigel), that have found their condemnation immediately by Levaditi and Hoffman, the opinion is uniform that it is impossible to account for the presence of *spirochaete pallida* only in syphilitic lesions in any other way but by assuming its etiologic quality. Critics remind us of the absence of experimental proof of this, according to the principles established about the conditions by which pathogenicity only can be proven. Instances that such precautions must be considered, to avoid mistakes, are known. On the other side, where characteristic lesions exist where they are always combined with the presence of specific organisms, this theoretic restriction can only be the stimulus to double the efforts to cinch the evidence by attempting to bring the experimental proof. The outlook for a positive result is today brighter as before, as several publications have been made in a way suggesting that the cultivation of *spirochaete pallida* is only a question of time. After this is done, the experiment will immediately finish the splendid work of Schaudinn with the last stone, the production of syphilis by a pure culture of the spirochaete. As it is, all syphilologists, without exception, have been compelled to accept this causative agent as the truth; most convincing was the result with experimental syphilis in monkeys and other animals, where the anatomic-pathologic changes could be studied on the basis of definite data and methods. The cultivation of spirochaete will allow of directing these experiments at vaccination and perhaps cure. That the reactions of the body to the syphilitic virus are the same as in other infectious diseases, has been shown, so that even the possibility exists to recognize obscure pathologic conditions by serum-reactions. As to diagnosis, the presence of *spirochaetæ pallida* is decisive, although often its demonstration is difficult. The two methods of demonstration, smear preparations and Levaditis' method of silver impregnation of tissue, have been much improved during the last year, so that they are in reach of everybody that wants to use them. Talking about the syphilis organism and the work done on it, must be short or exceedingly long. It would be impossible in a few sentences to give an about approxi-

mate representation of the lines in which it has run. The literature is easily accessible. Besides, the dermatologic department will give an extensive review.

In regard to other protozoic diseases, known and studied before, only few additions and changes to the knowledge so far possessed have been made. A contribution by Craig³⁰ must be mentioned, who demonstrated that in the cycle of the malarial parasites within the human body, there regularly occurs a process of conjugation of the merozoites, that it is absent in the incubation stage and in chronic malaria, and that the symptom complex of malarial attacks appears as soon as conjugation begins. The biologic interpretation of this process is that established for other protozoa by Wilson, Calkins and others, the assumption of an effort at rejuvenation, after a long series of divisions without sexual processes. The knowledge about yellow fever has remained as it was. The latest report of the French yellow fever commission (Marchoux and Simond³¹) has not added anything of importance to it, except the proof that fresh cases of yellow fever can be caused by infectious female stegomyias that are able to hibernate, just as Schaudinn has shown for the anopheles females and malaria.

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PEDIATRICS.

IN CHARGE OF

ALFRED FRIEDLANDER, M. D.

Feeding of Infants.—In reviewing the year's literature on the subject of infant feeding, one is struck by the fact that the same diversity of opinion, noted in previous reviews, still exists. The German school still refuses to work on the percentage theory, as advocated by American pediatricists. In Germany, the caloric value of the food is still made the basis of computation. In France and England—simple dilutions are still used—though in France whole milk feeding—even for very young infants, appears to be coming more into favor. It is noteworthy, however, that in America it is being recognized more and more clearly that laboratory modification of cow's milk on the percentage plan cannot afford the final solution to the problem. At the last meeting of the American Pediatric Society, Molt read a paper on "Some Phases of the Feeding Problem." Ardent advocate of the percentage system though he is, he admits that one of the great causes of trouble with the system "is the great number of complicated methods of calculating percentages which have been published." He feels that "we have erred in the refinement of our calculations"—and holds "that the essential thing is simplicity with moderate flexibility." In the discussion which followed the reading of the paper, there was practical unanimity of opinion as to the absolute necessity for simplification of method in modification. It is recognized that laboratory modification—even if it did offer the solution (and there are many reasons for doubting this) could only apply to a small fraction of cases needing substitute feeding; it is admitted that until some simple working basis for home modification can be found, the question cannot be considered settled.

Into the complex questions of milk chemistry—whose study is occupying so many men—whose discussions are filling the literature—it cannot be the part of such a cursory review as this, to enter. One has but to glance through the literature to see how much work is being done everywhere on the problem of the proteids for instance. And yet through it all comes the suggestive dictum of Jacobi that infant-feeding is not a matter of chemistry alone—that the baby is not a mere test tube. Meantime one fact stands out clear and distinct—namely, that the first requisite for *any* successful system of milk modification is clean, pure milk. It is recognized more clearly than ever before that no amount or kind of modification can make a poor milk good—it would almost seem safe to add as a corollary—that with good milk almost any rational system of modification will do. The world over, municipalities are beginning to recognize

their duty in this matter of supervision of the milk supply. It is a matter of congratulation to be able to record that in this respect some of our American cities are in the forefront of this great advance.

Abroad the spread of the institutions of the "Gouttes de Lait"² is noteworthy. These are in reality polyclinics—with milk-modifying kitchens attached—where babies are examined at regular intervals. The milk mixtures are ordered—and filled, at the institution—the food being either sold at cost or given gratuitously in appropriate cases.

Various observers^{3, 4, 5} have called attention to the value of citrate of soda in the modification of cow's milk. It is noted that the addition of the salt—gr. 1 to 2 to the ounce of milk—makes the curds much more flocculent and easy of digestion. A noticeable feature is the large proportion of milk in the feeding that the infant will tolerate without evidences of gastric irritation, or the appearance of any considerable amount of undigested casein in the stools.

Additional evidence as to the value of buttermilk-feeding has also been given^{6, 7}. Abroad, the use of conserved buttermilk is steadily increasing.⁶ Buttermilk, artificially prepared by the addition of pure cultures of the lactic acid bacillus, has also come into use.⁹ The advantage of this food is that the fat is retained, so that there is offered an easily digestible whole milk. These so-called buttermilk tablets are now in the American market, also. Meyer¹⁰ advocates the use of pepsin and hydrochloric acid, in appropriate doses, for nurslings. It is of especial value at the time of weaning, in children with the so-called "exudative diathesis," and in the convalescence from the acute diseases of infancy. Terrien¹¹ recommends the use of malted broths (2-3 litre of water, 1-3 litre milk, 70.0 cream of rice, 50.0 of cane sugar), where milk is badly tolerated, particularly if there be tendency to gastrointestinal irritability. Very young infants do not do well on the mixture.

Hygiene—School Hygiene. Cronin,¹² in a paper on health of New York school children, emphasizes the importance of the prophylaxis of the communicable diseases. He believes that the Department of Health should so control conditions that adenoids, tonsils and teeth might be properly attended to before the child is accepted as a member of a school, and looked after, regularly, thereafter. He even takes the rather advanced position that the child population of each tenement house should be immunized against diphtheria, by prophylactic injections of antitoxin, where a case is reported. He is an earnest advocate of a thorough system of medical inspection of schools. The necessity for looking after the physical condition of school children most closely is frequently alluded to in the literature. On the other hand, Czerny¹³ thinks that the importance of school strain is exaggerated. People ascribe to school what is really due to home environment. He believes that the mental strain on the child before it enters school is intense, if it associates much

with adults. Adults answer a child's questions all day long, and rejoice in its inquiring mind. In this way the child grows out of its "childishness," and signs of neuropathy develop. The effectual remedy is to allow children to grow up in the companionship of children. Discussing the so-called school anemia, Unruh¹⁴ ascribes to myocarditis (which he considers very common), albuminuria, or hypoplasia of the heart and great vessels, a large proportion of the cases generally ascribed to the school anemia alone. He urges repeated examinations of the heart, especially after the acute infections.

An interesting study of alcoholism in German school children was made by Hecker.¹⁵ Of 5,080 children examined, 33.7 per cent were abstainers, 55.3 per cent were moderate drinkers, 10.9 per cent were excessive drinkers. With increased use of alcohol came diminution in progress, in studies and in physical development.

Development.—Bovaird and Nicholl¹⁶ have made a careful study of the weights of the viscera in a series of 571 autopsies. They found that up to the fifth year there is a constant relation between the weights of the more important viscera, thus: The weight of the liver averages seven times that of the heart. The weight of the spleen averages one-tenth that of the liver. The weight of the kidney averages one-ninth that of the liver. They also find that the weight of the thymus, as commonly given, is excessive; that its average weight is six grammes, that there is no evidence of a growth of the thymus after birth under normal conditions, though under special conditions it may hypertrophy enormously.

Studying the relation of weight to the measurements of children during the first year, Fleischner¹⁷ finds that height and circumference of head, chest and abdomen increase as the weight in normal children, the greatest increase occurring in the first quarter of the year. In poorly nourished children, with weight below normal—all measurements are below normal. With stationary weight the increase in the measurements is very small—depending on the slight influence of age on the growth of these cases. The primary factor in the increase of measurements in the first year is the weight—the influence of the age being secondary.

Dentition.—Dunn¹⁸ believes that the commonest symptoms seen in dentition are *not* reflex but due to pain. They may arise from the tooth cutting the gum, or from irritation at the root of the tooth. The majority of symptoms attributed to a reflex irritation from the tooth are probably mere coincidence. There is a strong probability, based on clinical experience, that dentition may cause fever, disturbances of the ear and disturbances of digestion. It may possibly cause certain nervous disorders.

Diseases of the Newly Born.—The vitality of premature children. Ostreil,¹⁹ basing his observations on the literature and on examination of 1,542 premature children, accepts 44 cm. as the minimum height and 2,000 gm. as the minimum weight.

He is unable to find that these children showed less resisting powers in later life than children born at term. The morbidity and mortality during infancy and early childhood were not materially higher than those of ordinary children.

Specific Infectious Diseases.—Scarlet. Despite the work of many careful investigators, the definite etiological factor of scarlet has not been found. It would appear to be settled that the streptococcus group certainly plays an etiological role—perhaps only a secondary one. The investigations of Ruediger²⁰ are of interest in this connection. He found the *S. pyogenes* constantly in great numbers on the tonsils of patients suffering from scarlet before the inflammation of the throat had subsided.

Discussing the relation of oral sepsis to the severity of the attack, Hunter²¹ points out that the severity of the scarlet—that is to say of the septic complications, is greatly influenced by the degree of oral sepsis present. Thus, of cases without oral sepsis only 35 per cent had complications of moderate or severe degree, whereas of cases with oral sepsis, 65 per cent showed such complications. The severity of these complications was also much greater in the cases with oral sepsis. One aim of treatment should therefore be—to cleanse the throat as thoroughly and as early as possible. In this connection it may be noted that Solt²² reports excellent results from the use of throat compresses of 2 per cent sol. of salicylate spiritus. The effect on the adenopathy was very marked. With reference to treatment, Macrides²³ says that the disease is self-limited—and drugs are therefore useless, and may interfere with the kidneys. Treatment should aim to promote diuresis, and attenuate the toxic infection. This is to be accomplished by the use of tepid baths and artificial serum. He believes that antidiphtheritic serum may do harm.

On the other hand Lopez²⁴ says that in his experience early doses of antitoxin curtail suffering, lessen the risk to the patient and are absolutely without danger. There are no contraindications to its use. Saltykow²⁵ reviews the literature of the treatment of scarlet by antistreptococcic serum—adding some additional cases. He believes the Moser serum to be the best (this is a polyvalent serum), and is an earnest advocate of its use. He finds that, on the whole, it has produced very good results, and agrees with Escherich that the therapeutic value of the serum is not nearly well enough recognized.

As a prophylactic against scarlatinal nephritis Pater²⁶ recommends the use of a salt-free diet in scarlet. As soon as the fever has subsided, a diet of bread, rice, puree of potatoes, eggs—all without salt—with butter, light desserts and milk, is allowed. From his observations the author concludes that this liberal—but salt-free diet—is as safe as an absolute milk diet, and much more agreeable to the patient. This regimen, by strengthening the patient, shortens convalescence and puts the patient in better condition to withstand secondary infections or complications.

Diphtheria.—Sittler²⁷ is a warm advocate of prophylactic injections of antitoxin—especially in institutions. He finds that the period of immunity lasts from three to five weeks, that unimmunized children are more susceptible to diphtheria than children who have been immunized, that catarrhal affections of the mucous membranes predispose to the disease and shorten the period of immunity. The length of the immunization period is not increased by using doses larger than 500 units. Detot and Deguy²⁸ discuss one of the rarer complications of diphtheria—pleurisy. Purulent (streptococcus) pleurisy is always due to secondary infection. Serous pleurisy may occur—though rarely—independently of any diphtheritic infection. The ordinary modes of pleuritic infection are through the broncho-pulmonary system, the circulating system or through the mediastinum. Comby²⁹ reports three additional cases of diphtheritic paralysis cured by late injections of antitoxin. He believes that the antitoxin should be used in all cases of diphtheritic paralysis—whether the primary diphtheria was treated with antitoxin or not.

There appears to be a general consensus of opinion that the dosage of antitoxin is oftentimes too small.³⁰ The age of the patient is really not the best guide. The amount of membrane is of some value in determining the dose, still more important are the duration of the disease and the degree of toxæmia.

A single dose given at the beginning of the disease, will accomplish as much as two or three such doses given later. No harm can result from the use of the large doses. An average dose for tonsillar cases would be 3000 units—double that for laryngeal cases, repeated as necessary.

Rhodes³¹ urges the giving of the antitoxin at once—in large enough doses without waiting for the bacteriological diagnosis. He finds that the antitoxin is of great value in the treatment of non-diphtheritic anginas also. Bisson³² advocates the intravenous injection of the antitoxin, particularly in the severer (laryngeal) cases.

Meningitis.—Morse³³ analyzed 40 cases of meningitis occurring in infancy—the cases being about equally divided in number between the tubercular and cerebro-spinal forms. From his careful study of these cases in which the diagnosis was confirmed by the lumbar puncture or autopsy, Morse concludes that the picture of meningitis in infancy is different from that in childhood. The tubercular form has a more sudden onset and a shorter course than in later life. The symptomatology of both forms is the same at this age—though the symptoms of spinal irritation are somewhat more marked in the cerebro-spinal form. A positive diagnosis between the two forms is impossible from the symptomatology and can often be made, only by lumbar puncture. The puncture has no therapeutic value in the cerebro-spinal form, but is useful for the relief of symptoms in both forms.

Billings³⁴ has studied the cases—(numbering 2,755 in 1905) reported

in New York City in 1904 and 1905. The mortality in 1905 was 73.5 per cent. He finds that clinical investigation so far has thrown little light on the mode of transmission nor has any effectual method of treatment been discovered. It is altogether probable that the disease is most infectious during the first two weeks of its course. This finding is in accord with the researches of Bolduan and Goodwin³⁵ who found that the *diplococcus meningitis* was present in the nasal mucus in fully half the cases during the first week. They believe that the organism—though not the disease—is transmitted from the nasal secretion of one person to another. There appears to be no doubt but that the exciting cause is the *diplococcus intracellularis meningitidis*.³⁶ Koplik³⁷ calls attention to the value of percussion of the skull as an indicator for lumbar puncture—acute hydrocephalus caused by either form of meningitis may thus be detected. When the lateral ventricles are distended with serous fluid, the percussion note at a given spot varies with the position of the head. There is thus afforded a means of knowing when lumbar puncture—as a measure of relief for increased pressure effects, is needed.

Schlesinger³⁸ finds that by repeated lumbar puncture, it is possible to prevent convulsions in the tubercular form. He believes this measure to have distinct therapeutic value—and notes that five cases have been published in which recovery has occurred, although tubercle bacilli were found in the cerebro-spinal fluid.

With reference to treatment of the epidemic form Leszynsky³⁹ (who reports 30 cases with a mortality of 50 per cent) urges hot saline injections (rectal)—hot baths, cardiac stimulants, fresh air and repeated lumbar puncture. In one case the injection of 10 per cent lysol, injected into the spinal canal, appeared to have a good influence. Osborne⁴⁰ thinks that ergot, given intramuscularly or subcutaneously, is a very valuable therapeutic agent, and says that ice, ergot, and morphine will save many patients. Edlefsen⁴¹ recommends the use of iodic acid and its sodium salt (sodium iodate). Lumbar puncture and inunctions with silver salts are useful adjuvants.

Measles.—Chardin⁴² calls attention to the fact that relapses are not at all rare in measles. They may occur from five days to one month after the original attack, and last as long as the original attack. The form of the relapse is independent of that of the original attack and the relapse may be hæmorrhagic even though the original attack was not.

Pertussis.—The year has seen the usual list of “specifics” for whooping cough. Rothschild⁴³ was chloroforming a child for reduction of a congenital luxation of the hip. After the operation it was noticed that the pertussis, from which the child had been suffering, had disappeared. Thereupon, the author tried chloroform—by anaesthesia—in nine other cases—with excellent results. He says that this method of treatment is not original with him—and that good results had previously been reported.

Mumps.—Troitsky⁴⁴ reports thirty-three cases in girls, 13 of whom had complicating öophoritis. He calls attention to the fact that several writers have found atrophy of the ovaries after this inflammation—so that the complication has a sort of “sociologic importance.” With reference to the blood changes of mumps, Wile⁴⁵ finds that lymphocytosis—relative and absolute—is a constant concomitant and believes that it is a diagnostic point of value.

Influenza.—Clos⁴⁶ urges care of the oral mucous membrane in the influenza of childhood—on account of the frequency of adenopathy. The glands of the neck and the postpharyngeal glands are most often affected. This adenitis, accompanied by high fever, may constitute the dominant symptom of the malady—recalling the picture of glandular fever, which according to some authors is always an influenzal manifestation. The adenitis often revolves slowly and may end in suppuration—thus becoming the origin of a retropharyngeal abscess at times.

Habert⁴⁷ notes the frequency of convulsions in the influenza of childhood, the convulsions usually appearing at the height of the disease. Hot packs are highly recommended.

Escherich⁴⁸ reports excellent results from the instillation into the nares of five drop doses of pyocyanase (a proteolytic enzyme of *B. pyocyaneus*).

Typhoid.—Regis⁴⁹ reports as an early diagnostic sign a yellowish discoloration of the palms of the hands, and soles of the feet—perhaps as early manifestation of the toxæmia.

Miller⁵⁰ reports two cases showing that fæcal impaction may be the cause of serious abdominal symptoms in convalescence. In cases with persistent constipation enemata are not sufficient, and occasional laxatives should be used. In these cases exclusive milk diet is a mistake, and beef-juice, broths, milk with cereals and malt should be added. In these cases a liquid diarrhea, coming on suddenly, should excite the suspicion of fæcal impaction.

Chantemesse⁵¹ reports the result of five years use of his serum in typhoid. During this period, the average hospital mortality in children in Paris was 17.3 per cent. In the serum cases it was 3.7 per cent. There were no deaths in cases getting the serum in the first week—and no deaths from hæmorrhage. The serum is antitoxic and bactericidal—is used in small quantities and no bad effects have followed its use. Brunon⁵² and Josias⁵³ offer confirmatory testimony as to the value of this serum.

Glandular Fever.—Vipond⁵⁴ and Cheinisse⁵⁵ agree that glandular fever must be considered a clinical entity—a definite infection. The onset in children is usually sudden with torticollis, sore throat and constipation. The glands involved are those near the posterior margin of the sternocleido-mastoid. The principal differentiating features are the localization and evolution of the glandular affection, the lack of proportion between the throat manifestations and this glandular enlargement and the slight

tendency to suppuration. The axillary and inguinal glands are involved in most cases. Vipond recommends iced bichloride compresses locally.

Tuberculosis.—Concerning the origin of tuberculosis in infancy, Schlossman⁵⁰ takes the stand, based upon his experimental and pathological studies, that the infection is enterogenous rather than ærogenous, that infection occurs through the gastro-enteric rather than the respiratory tract. Though he insists upon the alimentary origin, he does not believe that the infection comes through cow's milk. Nor does it follow that tuberculosis of the intestinal tract must be the primary lesion, since it appears proven that tubercle bacilli can penetrate the healthy intestinal mucosa without the production of local lesion. Through the thoracic duct the bacilli get to the right heart, and so to the lungs—thence they come to the bronchial glands, which are particularly prone to tubercular infection. This view—that the bacilli are swallowed—getting to the respiratory tract secondarily, is also taken by Mathews.⁵⁷ It is noteworthy, however, that the weight of evidence seems to point more and more strongly to the inhalation theory of the origin of tuberculosis in infancy—though it is not to be questioned that there are undoubtedly cases of primary intestinal infection. Schlossman's view has not found acceptance in Germany—and his rather fanciful theory has been severely—and apparently successfully, attacked. In a general review of the subject of the mode and origin of the infection in early childhood, Hauser⁵⁸ claims that the weight of testimony is decidedly for the inhalation theory. His statistics show that 10 per cent of all children dying at the end of the first year show tuberculous lesions. The type of infantile tuberculosis is the lymphatic, with absence of primary effects. Pulmonary tuberculosis begins to be much more common in the second year.

With reference to diagnosis, Thomesco and Gracowski⁵⁹ report the results of their work with a modification of the agglutination test, as proposed by Arloing and Courmont. Their results were encouraging, though the difficulty of the technique as at present used would prevent the general adoption of the test. Salge and Schkarin⁶⁰ also obtained positive results with an agglutination test. Binswager⁶¹ recommends the tuberculin test as of especial diagnostic value in childhood. Carefully done, these injections are harmless, and in a very great degree reliable. Cruchet⁶² urges the examination of the stools of infants for the bacilli, using the method of Strassburger, which gives excellent results. The same author⁶³ has an interesting detailed discussion of tubercular pneumothorax in children, while Lhomme⁶⁴ takes up the subject of tubercular cavities in the nursing.

The importance of prevention of tuberculosis in school children is everywhere insisted upon. In Germany and France, societies have been formed to take predisposed children to forest, mountain or seaside schools for instruction. The good results of this most excellent work are gen-

erally noted⁶⁵⁻⁶⁶. As Morse⁶⁷ says in discussing the protection of infants and young children: "What can be done as to the separation of the children from tubercular parents and as to the sanitation depends in each case upon the circumstances of the family and the provisions for the care of the tuberculous made by the public. That is to say, protection against tuberculosis is largely a question of money."

Ganghofner⁶⁸ reports very good results from the *therapeutic* use of tuberculin. He holds that in small doses tuberculin is without danger and feels that the treatment is worthy of an extended trial.

Syphilis.—Numerous observers report findings of the spirocheta pallida in the various viscera in cases of hereditary syphilis⁶⁹. Tobler⁷⁰ found pronounced lymphocytosis of the cerebro-spinal fluid in twelve out of fourteen cases of hereditary syphilis in infants. This may be a diagnostic sign of much value as it may appear before other symptoms. In a paper on cerebral syphilis in childhood, Fairbanks⁷¹ describes three forms, leptomeningitis, endarteritis, and syphilomata. The clinical phenomena are very complex. Among early symptoms are mentioned vertigo, speech disturbances, disturbances of vision and sudden syncope. The prognosis depends upon the early recognition of the nature of the trouble, of its pathological character and its prompt treatment. The arterial degenerations are the least easily influenced by treatment.

Rheumatism.—Bovaird⁷² is inclined to accept the specificity of the diplococcus rheumaticus as the exciting agent, though it is admitted that the chain of evidence is not quite complete. According to Snyder⁷³ the evidence is far from complete. In fact he maintains that in many cases the diplococcus is probably the terminal, or at least secondary, invader. While admitting that English authors have broadened our conception of rheumatism in childhood, it is questionable whether they have not stretched it too far. Snyder says that, bacteriologically, the connection between rheumatism, endocarditis, chorea and tonsillitis has not been proven, though many writers, among them Bovaird⁷⁴, insist that the connection has been amply demonstrated. In a statistical study of 129 cases Kephallinos⁷⁵ shows that polyarthrititis is rare during the first year, that the second and third years are almost exempt, though this is a period of decided growth; that the age of greatest incidence is from the fifth to fifteenth years. Familiar tendencies were present in 50 per cent of his cases—in 23 per cent there was tuberculosis in the parents. There is no seasonal influence as to the first attack. Of his cases 70 per cent developed endocarditis, 25 per cent chorea. With reference to the relation of chorea and rheumatism Poynton and Holmes⁷⁶ report three additional cases in which a diplococcus was found in the pia mater in cases of chorea that proved fatal. The organism was also found in parts of the brain in these cases. The authors conclude from this—and other studies, that chorea is a manifestation of acute rheumatism. Discussing acute

fatal chorea, Leante⁷⁷ says that in at least one-third of the cases the chorea is due to rheumatic infection. This fatal form shows all the characteristics—both as to symptomatology and course—of an acute infection. Thayer⁷⁸ analyzes 808 cases of chorea seen at Johns Hopkins Hospital. He finds that in 25 per cent of the out-patient and in 50 per cent of the ward cases, there was evidence of cardiac involvement. Cardiac involvement was somewhat more frequent in the cases with a history of polyarthritis. There would appear to be reason to believe that the presence of fever in otherwise uncomplicated chorea is in a large proportion of cases associated with a complicating endocarditis.

Diseases of the Digestive System.—Pyloric Stenosis. In 10,000 cases Heubner⁷⁹ saw 45 cases of pyloric stenosis—21 of these he was able to follow up. Only two ended fatally. Heubner believes this disease to be a congenital—pure functional gastric neurosis. In his studies he has never been able to convince himself that there existed in any case a true organic stenosis with hypertrophy of the musculature and connective tissue. With reference to treatment he advises long intervals between nursings—the feedings being as large as the child will take, warm abdominal compresses and opium and atropine by rectum. Operation is not considered, except as a last resort and never before the third month. Fisk⁸⁰ has collected the reported operative cases. They number 71—with 33 deaths (46.4 per cent). He believes in early operation. Fischer and Sturm-dorff⁸¹ in discussing a case with early operation say that three stages should be recognized—spasm, spasm and hypertrophy, tumefaction and stenosis of the pylorus. In the first and second stages medical treatment is still of great value; in the third stage operation offers the only chance of relief.

Recurrent Vomiting.—Fischl⁸² says that in a certain percentage of cases recurrent vomiting is a manifestation of hysteria—reporting three such cases. Granfelt⁸³ insists that in some cases recurrent vomiting occurs as one symptom of chronic appendicitis particularly in those cases with strong adhesions. Dickinson⁸⁴ calls attention to the importance—and frequency—of nephritis as a complication of the severe cases. Under the name of “food fever” Smith⁸⁵ describes a form of alimentary fever coming on suddenly with signs of indigestion—lasting from several days to as many weeks. Nervous children of both sexes are affected and the attacks are apt to recur. Smith considers that some cases of cyclical vomiting belong to this category—the cases being some form of autointoxication or intestinal catarrh. Myers⁸⁶ reports good results from the use of bicarbonate of soda to stop the vomiting, while Vanot⁸⁷ recommends citrate of soda.

Dysentery.—Concerning the bacteriology of dysentery in infancy Auché and Campana⁸⁸, after careful clinical and bacteriological study, conclude that various types of the dysentery bacillus may be causative factors in

the different forms—though at present it is not possible to establish clinical types to conform to these various forms of bacillus. Vaillard and Dopter⁸⁰ report 90 cases of dysentery treated with antidyenteric serum—with 89 recoveries.

Peritonitis.—Pneumococcus Peritonitis. From their study of the literature and their own cases, Annand and Bowen⁸⁰ find that pneumococcus peritonitis is a condition often overlooked. In one-third of the cases the affection is secondary to a pneumococcic infection elsewhere—lungs, pleura and middle ear. Two-thirds of the cases are primary—infection coming from the bowel. In about half the cases, the pus is encysted, and the diagnosis therefore easy. Under operation the prognosis in these cases is good—of course far better than in the other class of cases of diffuse peritonitis. Clogg⁸¹ reaches similar conclusions.

Diseases of the Respiratory System.—Pneumonia. Kephallinos⁸² found the knee-jerk absent in 50 per cent of 65 children with croupous pneumonia (Westphal's sign). In some cases the loss of the knee-jerk antedated all physical signs in the lungs. This sign may therefore be of diagnostic value in doubtful cases. It is noteworthy that the knee-jerk is never missed in typhoid, erysipelas or the acute exanthemata, so that it is not to be attributed merely to the fever.

Enlarged Bronchial Lymph Glands.—Various observers have called attention to the value of radiology in the diagnosis of enlarged bronchial lymph glands. Roux and Josserand⁸³ examined 588 children—119 cases showed signs of enlarged tracheo-bronchial glands; all of these cases showing apical lesions; 144 showed signs of enlarged glands without pulmonary lesion showing that the adenopathy—in many cases at least—is the primary lesion. The authors regard radiology as of great value in this diagnosis—especially as an adjuvant to other methods of physical examination. De la Camp⁸⁴ and Roederer⁸⁵ note that while normal glands do not give a shadow, inflamed glands do. Roederer advocates the therapeutic use of the x-rays in the treatment of enlarged bronchial glands. It is worth noting that Mouriquand⁸⁶ reports a case where an enormous packet of bronchial glands was discovered at autopsy. X-ray examination intra vitam had been absolutely negative. Banet⁸⁷ lauds the use of x-ray as an aid to diagnosis in chest conditions in childhood.

Diseases of the Blood.—Anæmia Infantum Pseudo-Leukæmica. There is still much discussion as to whether or not this syndrome is to be classed as a definite disease. Flesch and Schlossberger⁸⁸ conclude that we must consider the condition as a distinct entity. It is a disease of early life, running a course like that of leukemia, with large splenic and hepatic tumor, and adenopathy, with oligocythemia, oligochromemia and leukocytosis. It is probable that the disease is to be classed as midway between a simple and a progressive pernicious anemia. The etiology is obscure, though it is not improbable that the process is a toxic origin.

Leukemia.—Weill⁹⁹ reports a case of a child of three, showing all the signs of scurvy until the blood examination cleared the diagnosis by showing the picture of a true lymphatic leukemia. Flesch¹⁰⁰ reports a case of myelogenous leukemia in a child, which by treatment with the x-ray was transformed to a lymphatic leukemia. He also reports two cases of lymphatic leukemia in which treatment by the x-ray was absolutely without avail.

Purpura Fulminans.—Audeoud¹⁰¹ reports a case of Henoch's purpura in a child of two and a half years, with sudden onset, generalized spread, and death in seventeen hours. Gaillard and Huertas¹⁰² report a similar case in a child of thirteen months, with death in forty-eight hours. Longely¹⁰³ reports the case of a girl of 15 years, tubercular, with three attacks of purpura within six months, in which the exhibition of adrenalin was followed by excellent results.

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OPHTHALMOLOGY.

 IN CHARGE OF

 JOHN GREEN, JR., M. D.

Physiology.—The question as to the influence, if any, of the ciliary ganglion on the production of the aqueous humor has been investigated by Landolt.¹ Claude Bernard stated that the removal of the ganglion arrested the formation of the aqueous. Landolt, experimenting on dogs, removed the ciliary ganglion from one orbit and subsequently tapped the anterior chamber of each eye. He found no appreciable difference in the rate of formation or quantity of aqueous in the two eyes, and hence concludes that removal of the ciliary ganglion does not, in any way, affect the formation of aqueous humor. The conception and localization of the loss of the pupil reflex to light is discussed by Bach,² who suggests the following definition of reflex immobility: "A pupil is reflexly immobile if it reacts neither directly nor indirectly to light nor to nervous or psychical stimulation, but contracts promptly and fully upon convergence." He holds that reflex immobility is produced by the absence of a tract which extends from the corpora quadrigemina to the medulla oblongata, or in some cases, transitorily, by irritation of an inhibitory centre lying there, and that the miosis is dependent upon the absence of sensory spinal tracts and the loss of psychical irritation from tracts which extend from the cerebrum to the medulla oblongata. The lid closure pupil reflex (Gifford-Galassi) was observed by Ballantyne³ in a young girl affected with chorea. In this case, the pupil contracted whenever the lids were spasmodically closed. The phenomenon is apparently without diagnostic significance and is probably to be ascribed to an associated action of the iris-sphincter and the orbicularis palpebrarum.

A new entopic phenomenon of the arterial pulse (pulsatile phosphene) has been described by Antonelli⁴ and Baslini.⁵ After moderate physical exercise in the dark, small luminous spots appear and disappear rhythmically before the open eyes. Antonelli states that the impression is that of a luminous pulse synchronous with the arterial beat. Baslini explains the phenomenon as an excitation of the retina from excessive pulsation of its arteries.

A study of the phenomena associated with the production of stationary waves by reflexion from plane surfaces has led Rachlmann⁶ to formulate a new theory for the purpose of explaining how the energy of light waves is transmitted to the sensory end organs in the retina. His paper is reviewed by P. J. Hay⁷ as follows: "It has hitherto been generally accepted that the waves of light pass through the layer of nerve fibres, then enter the region of rods and cones and are transmitted by the latter

to the conducting apparatus. Thus, apparently, the energy of light travels through the conducting layer and then acts in the receiving end organs in a direction opposite to the one in which it is transmitted to the former. On the other hand, the direction of transmission is steadily maintained in the case of all the other special senses, a law to which the retina also conforms. The outer segments of the rods and cones are much more highly refractile than the inner ones, and act as transmitters, in that they reflect the greater part of the light into the inner, the perceptive segments, in the form of stationary waves. These vary in length according to whether the light is monochromatic, a mixture of two, or three, or more colors. In other words each color or mixture of colors is characterized by stationary waves peculiar to itself, having a fixed position in the inner segment, thus stimulating it in a certain definite manner."

Pathology and Bacteriology.—Our knowledge of the pathology of keratitis parenchymatosa has been enriched by Elschnig,⁸ who had the opportunity of examining, microscopically, a very typical case. He found division and proliferation of the corneal cells which lie in the normal or distended interlamellar spaces partly intermingled with leukocytes. These cells undergo, in some parts, a curious form of necrosis with absorption of the intervening lamellæ, while the process of final restitution again proceeds from the fixed cells which proliferate in the neighborhood of the necrotic foci. The new vessels which appear participate in the process, but more by supplying material for the building-up process and not by the production of connective tissue. These vessels are merely endothelial tubes which lie superficially along the whole periphery, but ramify into the deeper layers in the more central parts of the cornea. Elschnig concludes that corneal changes are certainly of primary origin, and due neither to syphilis nor to tuberculosis of the cornea, nor to affections of the endothelium of Descemet's membrane. The nature of the degenerative alterations of the fibres of the crystalline lens is now being investigated by Mlle. Trufesco.⁹ Her preliminary researches lead her to the following conclusions: In senile cataract there is a fatty degeneration of the crystalline fibres; at first the fat globules are in the interior of the fibres, later the fibres are separated into fibrillæ which subsequently disappear, and in the advanced stage there is a homogeneous mass interspersed with vacuoles. The vacuoles represent the spaces occupied by the fatty globules, and do not appear until these globules have been dissolved by reagents. Certain granular masses in the spaces between the separated fibres appear to be only fat globules. Fatty degeneration of the crystalline fibres is observed particularly toward the equator of the lens. There are probably several varieties of fat in the degenerated fibres.

Polati's¹⁰ examination of two very highly myopic eyes (M. higher than

30 D.) revealed such extreme thinning of the sclerotic that in places there was actually an interruption in continuity. The optic nerve was partially atrophic and was distinguished by the presence of numerous cavities (cavernous atrophy) and secondary proliferation of the glia. This type of optic atrophy has been found, so far, only in glaucoma.

The occurrence in highly myopic eyes of large venous trunks closely resembling vortex veins, but disappearing in the neighborhood of the disk, was first described by Schoute in 1898. These occur as large vessels, without lustre or reflex, lying behind the retinal vessels, and collect blood from a ramified system of broad trunks. The large trunk formed by the junction of these ramifications disappears at or near the edge of the disc. Coats¹¹ had the opportunity of examining such a system in a highly myopic eye, and came to the conclusion that chorio-vaginal veins were anatomically large veins which pass from the choroid into the nerve and course backward close under the pial sheath; that they were formed by the enlargement of anastomoses which normally occur in this situation, and that this enlargement constituted, in most cases, a collateral circulation to compensate for a hindrance to the exit of blood by the normal vortex veins.

Trousseau¹² gives a description of a tumor, about the size of an olive, extending from the caruncle to the corneal limbus. The overlying conjunctiva was traversed by large vessels. Microscopically, it proved to be a fibrous tumor of the submucous connective tissue. Trousseau can find no other instance of literature of such a tumor in this situation. Another rare condition—racemose neuroma associated with hydrophthalmus—is described by Rosenmeyer.¹³ The chief mass of the tumor was situated in the lid with bands extending into the orbit.

The bacteriology of the eye and its adnexa is yearly receiving more and more study. Our present knowledge of this subject has been thoroughly covered by the papers of G. S. Derby,¹⁴ Weeks,¹⁴ Shumway,¹⁴ Brown Pusey,¹⁴ and Thomson.¹⁴ Derby's paper, "The Bacteriology of the Eyelids," covers this branch of the subject exhaustively and contains a full bibliography. In this connection it is interesting to note that Wright's work on opsonins and the opsonic index has had a practical application in ophthalmology, especially in connection with recent work on phlyctenular conjunctivitis. Thus, Nias and Paton¹⁵ assert that true tuberculosis of the conjunctiva bears the same relation to phlyctenular conjunctivitis that lupus bears to erythema induratum, the one due to tubercle bacilli, the other presumably to tubercular toxins. Cases of tubercle may be divided into two classes: In the first there is a purely local infection, with no general systemic infection; this class is characterized by a persistently low index and the frequency of phlyctenular conjunctivitis. In the second class, periodic systemic infections take place, characterized by sudden rises of the index far above normal. As a result

of their investigation, the writers recommend the treatment by means of tuberculin of cases of persistently recurring phlyctenules with a low opsonic index.

Congenital anomalies.—A curious anomaly of the fundus (hitherto undescribed) is reported by Stark and v. Szily.¹⁶ At the region of and immediately surrounding the disk there appeared a deeply excavated, slightly oval area of about four disk diameters, surrounded by a halo. At the bottom of the excavation a normal disk could be seen. Ocular movements similar to those found normally in the ungulates are described by Phillips.¹⁷ His patient could maintain both eyes in normal binocular fixation. With either eye fixing straight ahead, he could turn the other out slowly and back again to double fixation. He was able to converge both eyes and move them simultaneously to extreme divergence. He could hold one eye in any position and fix the side of his nose with the other. There has never been diplopia, and both eyes are in focus at the same time. Extensive remnants of the fetal ocular vessels are described by Ruhmandl.¹⁸ He found in the vitreous a network of fine whitish threads and the remnants of two vessels branching off from a swelling in the stem of the artery, one upward and outward, one downward and inward.

Instruments and Apparatus.—A double safety ophthalmic drop bottle has been devised by Cooper.¹⁹ It possesses the very distinct advantage that it may be sterilized without removing the glass stopper or rubber nipple, and is so compact that the set of nine bottles, with spirit bottle and lamp, may easily be carried in the pocket. The unquestioned value of transillumination of the sclerotic as an aid to the differential diagnosis between idiopathic separation of the retina and that due to tumor has led to the construction of several transilluminators. Lange's²⁰ instrument consists of a hard rubber cylinder containing at one end a small electric glow lamp. The end of the rubber cylinder is capped by a nickeled clasp, into which is fixed a glass rod 5 cm. in length. The free end of the rod is slightly curved and terminates in a point 2 mm. in diameter. Another instrument which possesses many points of superiority has been devised by Wuerdemann.²¹ To the already existing methods of localizing foreign bodies in the eye and orbit by means of radiography is added a new method by Holth.²² Lead buttons affixed by sutures to the conjunctiva at the highest and lowest points of the cornea are used as guides. Two pictures are taken, one through the temples, the other occipito-frontal. The position of the foreign body is ascertained by direct measurement on the plates, allowance being made for the fact that, owing to their position with regard to the tube and the eye, the measurements on them exceed the real ones by one-tenth. The need of protecting the globe during the play of x-rays upon the adnexa for therapeutic purposes has led Van Duyse and De Nobeles²³ to construct a shield consisting of "Paris

enamel," closely resembling an artificial eye. This is slipped into the sac in front of the eye. An improved hand electro-magnet is described by Parker.²⁴ While comparatively small, light and easily handled, it is more powerful than any hand magnet hitherto constructed. A unique feature is the construction of the ends of the tips. They are made concave or cup-shaped, thus to a large extent avoiding the "nipping off" of the metallic fragment as it is drawn through the sclera. A new punch for removing membranes from the postpupillary space in traumatic or secondary cataract has been devised by Stevenson,²⁵ who is also the inventor of a new advancement forceps and needleholder. A sterilizable lacrimal syringe is offered by Wilder.²⁶ It consists of a glass barrel with a piston wrapped with asbestos string. The form and construction of many eye instruments as found in the shops, has called forth considerable adverse criticism from Landolt,²⁷ who offers suggestions as to improved models. Every worker with the amblyoscope has experienced difficulty in varying the degree of illumination in the tubes to suit the exigencies of the individual case. To overcome this drawback, Black²⁸ has had constructed illuminating boxes, each containing a four-candle power lamp which are attached to the amblyoscope at the distal ends. A rheostat controls the illumination of each lamp. The need of an efficient binocular pupillometer seems to have been realized by Ohm.²⁹ By means of a system of prisms, the images of both pupils can be brought into juxtaposition and thus measured with the greatest accuracy. An instrument designed to facilitate the discovery of scotomata in glaucoma—a scotometer, so-called—is described by Priestley Smith.³⁰ Aubaret³¹ offers a new model of a campimeter, designed to supplement the hand test in the determination of the visual field.

Therapeutics.—The new local anesthetic—alypin—first brought to the notice of the ophthalmic world in 1905, has been the subject of much investigation, and seems to have found rather more favor than its immediate predecessor in the same field—stovaine. A somewhat adverse opinion is expressed by Landolt,³² who found that a four per cent solution combined with adrenaline 1-10000 was slower in action than cocaine, caused more smarting, and in some cases, at least, produced a dessication of the corneal epithelium. A number of papers dealing with serotherapy have appeared, and on the whole, the method seems to be gaining ground, especially in suppurative conditions of the lacrimal sac and anterior segment of the globe. Thus Blanco³³ reports the successful use, subconjunctivally and subcutaneously, of antistreptococcic serum in hypopyon ulcer and in threatening suppuration after cataract extraction. Doyen's antistaphylococcic serum is believed by Darier³⁴ to have been of distinct help in a case of purulent dacryocystitis. Schwartz³⁵ reports a case of tubercular conjunctivitis completely cured by thirty-seven injections of Marmorek's antitubercular serum. A highly suggestive paper is

that by Reuchlin,³⁶ on his experience with Koch's tuberculin. Two cases of choroiditis and fourteen of iritis and cyclitis, the tuberculous nature of which had been determined by the preliminary injection of 1-2-3 mgm. of old tuberculin, were subjected to a systematic course of injections. His success should certainly stimulate further experimentation in the same direction. Dionin finds each year a wider application. Hinshelwood³⁷ finds a one per cent to two per cent solution of undoubted efficacy in relieving soreness and discomfort of the eyes so often present in neurotics, apart from any demonstrable disease of the eyes. He has also found it useful in the pain of eyestrain. Used in powder in conjunction with powdered atropine dusted into the conjunctival sac, it has been found of great service in breaking firm posterior synechiæ (von Arlt³⁸ and Foerster³⁹). While the various preparations of the suprarenal gland continue to find favor in ocular surgery, the conviction has been growing that such preparations are not only useless, but frequently harmful in inflammatory affections of the eye. To this statement there appears to be one notable exception, namely, spring catarrh. Perret, in 1901, called attention to the almost specific action of adrenalin in this disease, and Grimsdale⁴⁰ has confirmed this observation. The application of radium to trachoma has given results not wholly encouraging. Thielemann,⁴¹ who exposed one eye only, the fellow being untreated to serve as a control, concludes that radium causes follicles and granulations to disappear, leaving the epithelium comparatively unaffected. Birch-Hirschfeld⁴² found that, while the granulations disappeared for the time being, other granulations soon made their appearance. The disappearance of the masses under radium was confirmed microscopically. More successful were Mackenzie-Davidson's results in the treatment of rodent ulcer. He used 10 mgm. radium sealed in a glass tube, thus utilizing the beta and gamma rays and excluding the alpha rays. The tube was held immediately over the affected part. It was applied 20-40 minutes to one part of the ulcerated surface, then moved to another portion until the whole of the ulcerated area had been exposed. He reports a definite cure in twelve cases of rodent ulcer, one of recurrent epithelioma of the cheek, and one of mole on the face. The question of operation vs. radiotherapy in epitheliomata of the eyelids is again engaging the attention of many surgeons. It can hardly be denied that less roseate views regarding the efficacy of radiotherapy prevail today than five years ago. In Trouseau's⁴⁴ experience, the rays have produced good results in limited superficial epitheliomata, but have been far less efficient in true ulcerative spreading epitheliomata. In the light of our present knowledge, Trouseau favors operation as the method of choice, but hopes that, with improved technique and more accurate knowledge of indications, radiotherapy will eventually prove the better treatment. Other workers, however, are much more optimistic (Ring⁴⁵). Valude⁴⁶ succeeded in

curing two cases of blepharospasm of several years' duration by a series of injections of alcohol at the point of emergence of the facial nerve in the temporal bone. In the treatment of gonoblenorrhea, Bernheimer⁴⁶ advocates the use of airol powder. It appears to owe its beneficial effect to the formation of free iodine. Koster⁴⁷ advocates the use of a three to five per cent solution of chlorate of potassium in various inflammatory conditions, especially in chronic conjunctivitis with dryness, itching of the eye and a foam-like secretion at the angles. Terson⁴⁸ recommends the synthetically prepared guaiacol, especially in burns of the conjunctiva and tuberculosis of the superficial structures. Added to copper sulphate collyria, it renders the latter much less painful. It should be exhibited internally in ocular troubles associated with general tuberculous conditions.

In a statistical report on the use of argyrol, protargol and silver nitrate in ophthalmia neonatorum and gonorrheal ophthalmia of adults, Standish⁴⁹ concludes that the modern silver preparations are efficient in the control of gonorrheal infection of the conjunctiva, and that they have greater bactericidal properties than the laboratory experiments upon other microorganisms would lead us to expect. He describes a method devised by Hussey, of the Massachusetts Charitable Eye and Ear Infirmary, for the continuous application of collyria, as argyrol, to the eye: After the skin in the neighborhood of the eye has been washed with alcohol, a kind of dam around the eye is constructed with putty and the argyrol is poured into the receptacle.

Wuerdemann⁵⁰ reiterates his belief in the efficacy of digital massage in the treatment of recent embolism of the retinal artery. Massage permits a flow of blood past the obstruction and keeps up the retinal nutrition until sufficient absorption of the clot has taken place. A method of treating trachoma by massaging the cocainized everted upper lids with boric acid (powdered), applied with a cotton wound probe, is suggested by Pratt.⁵¹ Roehmer⁵² has experimented with Bier's congestion hyperemia in certain diseases of the eye. Hyperemia of the eyes and head was produced by constricting the neck with an elastic band. No very conclusive results were obtained. In order to obviate the disagreeable neck-constriction, Hesse⁵³ produced a localized ocular hyperemia by adjusting a suction apparatus to the brow and cheek. Electrolysis, phototherapy and radiotherapy have been employed by Sulzer⁵⁴ to clear corneal opacities. He believes that electrolysis, combined with phototherapy, is the method of choice in corneal opacities. Sclerosis of the cornea is best influenced by phototherapy alone. In nervous subjects, phototherapy may be replaced by radiotherapy. Iridectomy in glaucoma simplex has given such extremely discouraging results that a spirit of therapeutic nihilism has taken possession of many ophthalmologists. That such an attitude is unjustifiable is shown by Posey,⁵⁵ who relates cases of this disease carried

along for years by the intelligent and persistent use of pilocarpin and eserine.

Operations.—Twenty-six prominent German, French and Dutch ophthalmic surgeons⁵⁵ have contributed an extraordinarily interesting symposium on cataract extraction. Each operator describes, in brief, his own particular maneuvers. The great majority follow classical methods, with individual modifications of no great importance. The methods of Trousseau and Czermak are, however, radically different. The former reduces his armamentarium to a single instrument—a Graefe knife—even dispensing with the speculum. Capsulotomy is performed as the knife is traversing the anterior chamber and the lens is expressed by the back of the knife applied to the lower part of the cornea. Czermak makes either a downward section without iridectomy or an upward section with iridectomy. The lens is then expressed into a subconjunctival pouch and delivered. A modified iridotomy (to replace the iridectomy of the combined operation) is proposed by Verhoeff.¹⁴ After button-holing the iris at its root, one blade of the iris scissors is passed behind the iris to the pupillary border and the tissue divided by a single snip. Much the same effect is attained by Stevenson,¹⁴ who, after withdrawal of the iris folded on itself, effects a sphincterotomy by a single snip of the scissors held vertically. A novel operative method for chronic glaucoma is described by Lagrange.⁵⁶ This operation has for its end to make safely a pervious cicatrix in the region of the canal of Schlemm without the least prolapse of the iris. After eserine, an incision is made in the sclera parallel to the upper edge of the cornea, freeing the filtration angle as exactly as possible. The instrument is rotated back, thus bevelling the sclera. A large conjunctival flap is cut, which is turned forward over the cornea. The small piece of sclera left attached to the cornea is then resected. Lastly is performed a large iridectomy (in two stages). After healing, a narrow line beneath the transparent conjunctiva represents the weakened portion of the sclera. In every instance this procedure has produced a cicatrix which allows of ready escape of the intraocular fluids. Cataract expression in the capsule (the Smith or East Indian operation) has come in for considerable adverse criticism. Maynard,⁵⁷ from an experience of 175 operations of this kind, is by no means willing to concur in the idea that the operation merits unqualified endorsement.

A modification of Antonelli's intermarginal operation for chalazion, with a view to avoiding hemorrhage into the lid tissues, is advanced by Baudoin.⁵⁸ He first punctures the chalazion with the galvano cautery, then expresses the contents with the fingers. A simple method of relieving ectropion, of whatever degree, is warmly advocated by Jocqs.⁵⁹ Three vertical lines of cauterization are drawn from the cul-de-sac to the free margin of the lid. The lid is then placed in proper position and the upper and lower lids temporarily united. A distinct advance in the treat-

ment of symblepharon has been made by Wilder,¹⁴ who has devised as a support for his Thiersch grafts, metal plates coated with paraffine. A new method of operating in pannus is described by Primrose,⁶⁰ who severs, subconjunctivally, a conjunctival vessel adjacent to the vascularized portion of the cornea. The mechanical pressure and irritation of the extravasated blood sets up a localized inflammation, and thus causes obliteration of the pannus vessels. A modification of the ablation operation of total staphyloma of the cornea is proposed by Gonzalez.⁶¹ After division of the conjunctiva around the cornea, he dissects it back to the equator of the globe. Several needles are then passed through the base of the staphyloma within the corneal margin. After excision the needles are drawn through and tied and the conjunctiva is sutured in front of the corneal wound, thus forming an additional protection against escape of vitreous. Oliver⁶² has proposed a new single-stitch operation for advancement, the excellence of which can only properly be appreciated by perusing the author's original description.

Traumatisms.—The ocular catastrophes that may follow the injection of paraffine in cases of saddle-nose are discussed by Uhthoff⁶³ and Rohmer. The former describes a case in which, three months after the injection of soft paraffine in the bridge of the nose, the lids of one eye became suddenly swollen and could not be opened spontaneously. The swelling was due to an inflammatory new formation of tissue secondary to the migration of paraffine into the lids. Rohmer⁶⁴ reports a case of thrombosis of the central vein following paraffine injections. The following precautions are deemed advisable: (1) The paraffine used should have a melting point of 41-42 C.; (2) pressure during injection should be avoided; (3) the injection should be made through a thick canula, to avoid piercing a vein; (4) injection of paraffine into the orbital veins may be avoided by compression at the angles of both eyes; (5) a small quantity (say 1 to 1.5 cc.) should be injected at one time. An investigation into certain varieties of nonmagnetic steel was undertaken by Snell.⁶⁵ This subject is of great interest to ophthalmic surgeons, in view of the futility of magnet operation, when steel of this character has penetrated within the eyeball. Especial interest attaches to the manganese alloy. When the manganese content reaches 12 per cent, the alloy is almost completely non-magnetic. The difficulties of localizing glass and stone within the eyeball by radiography are well known. Nevertheless, clinical experience and the results of experiments prove, according to Sweet,⁶⁶ that in many instances even small particles of these substances can be shown on the plate if the situation of the body permits the shadow to be cast free from that of the denser portions of the orbital bones. The best pictures are those obtained from lead glass which gives a shadow even more intense than iron and steel. Monthus⁶⁷ calls attention to the happy effect of tarsorrhaphy in certain injuries of the eyeball. The cases especially

adapted to this method are penetrating wounds of the sclero-corneal margin. Only the central portion of the lids is united, the occlusion being kept up for a fortnight at least. Contraindications to the procedure are foreign body within the globe, wounds of the lens in the adult, and an infective keratitis of rapid evolution.

Glaucoma.—A case of "tuberculous" glaucoma is reported by Hirschberg.⁶⁸ The usual symptoms were present including cupping of the disk. The vascular iris was occupied peripherally by greyish masses. A particle excised by iridectomy showed granulation tissue containing large numbers of epithelioid and giant cells. Glaucoma consecutive to contusion of the globe is discussed by Villard,⁶⁹ who reports three cases. The rarity of the affection is attested by the fact that there are only 24 cases in literature. The disease is not peculiar to any particular age and the pathogeny is uncertain. Obstruction of the suprachoroidal lymphatic spaces following a hyperemia and serous exudation of the choroid has the support of the only histologic examination so far made. Brav⁷⁰ notes the occurrence of acute glaucoma in a cataractous eye following the instillation of several drops of adrenaline.

Refraction and Optical Questions.—The clinical indications for yellow glasses in ophthalmology are discussed by Motais.⁷¹ The yellow should be of such a tint that by transmitted light it appears slightly orange, by reflected light, brownish. Such glasses increase the apparent illumination of objects and feel soft to the eyes. Analyses of the spectra of various tints of coloured glasses show that the violet end of the spectrum is shortened by all while the red end is unaltered. Motais concludes that the rays which irritate the retina are the chemical ones. Yellow glasses are indicated in cases of retinal hyperesthesia or of disease of the deeper tunics in which blue or smoked glasses are ordinarily used. They are also to be recommended for mountaineering and motoring. The influence of full correction on the progression of myopia and on detachment of the retina is discussed by Vacher and Baillart.⁷² Two groups of cases are considered. (1) Young myopes, without lesion in the back of the eye, who have full range of accommodation. (2) Older patients with atrophy of the ciliary muscle and possibly also lesions of the fundus in whom the power of accommodation is lessened. In the first group excessive convergence is best avoided by full correction and a proper working attitude. In the second, full correction will not be tolerated at once, but must be worked up to. The authors formulate the following rule: "Correct the total myopia in all cases in which it is less in dioptries than the age of the patient in years. If the contrary is the case, endeavor to arrive at a full correction gradually." A consideration of the late results (after 3-7 years) in 75 eyes operated for high-grade myopia leads Sidler-Huguenin⁷³ to the following conclusions: (1) Lens extraction cannot be regarded as a palliative in the progress of myopia and its

complications. (2) There is a definite risk associated with the operation which should be explained to the patient. (3) The same precautions need to be taken after as before operation to spare the eye. (4) Operation should only be recommended to patients who cannot get sufficient sight from glasses to follow their occupations. Stevens⁷⁴ describes a new phenomenon of color conversion. When a narrow strip of color surrounded by a large area of the complementary color is looked at fixedly, the color of the narrow strip will disappear and be replaced by that of the surrounding field. Stevens explains the phenomenon by chromatic aberration of the media and diffusion of the different colored rays owing to unequal accommodation. An elaborate historical research on the "Visual Acuity" beginning with the Arabs, Greeks and Persians is contributed by Pergens.⁷⁴

The universal use of homatropin as a cycloplegic preliminary to refraction lends interest to a report by Hotz⁷⁵ of almost fatal poisoning by a 2 per cent solution. The symptoms were headache, nausea, mental excitement, with subsequent unconsciousness, rapid pulse and slowed respirations. Recovery under stimulation.

Eyelids.—Priestley Smith⁷⁶ examined microscopically the lid margin in a case of congenital distichiasis, and found the Meibomian glands completely absent, their place being taken by hair follicles. An extraordinary example of retraction of the elevator muscles of the eyelids is recorded by Truc.⁷⁷ Both upper lids were drawn far up. The upper lid failed to follow the downward rotation of the globe and attempts at closing the eyes evoked slight motion of the lower lid only. Even during sleep the closure was imperfect. Truc exposed the upper border of the tarsus through a skin incision and freed it from its muscular attachments along its entire length, thus producing an accentuated ptosis and eventual cure.

Lachrymal Apparatus.—Giani⁷⁸ alludes to Fournier's doctrine that certain affections are "parasyphilitic" and by analogy proposes to employ the term "paragonorrhoeal" to certain of the developments of gonorrhoea. He relates a case of double dacryoadenitis occurring during the active stage of gonorrhoea. Gonococci were present in the urethral discharge but none could be found on the conjunctiva or in the material drawn from the lachrymal gland by exploratory puncture. The disease is ascribed to the toxins of the gonococcus.

Conjunctiva.—Trantas⁷⁹ describes a new and pathognomonic sign of vernal conjunctivitis, namely, the appearance of small round or oval spots of whitish or greyish white color which lie at various depths in the limbal excrescences. Under magnification they resemble colonies of microorganisms developed in a gelatine medium. Microscopically, they are found to be cystic cavities formed by the degeneration of the epithelial processes. A small tumor adherent to the rectus internus was found microscopically to be a necrotic cysticercus cellulosa. The authors, Morton and Coats,⁸⁰

state that a systicercus in this situation is very rare. The subject of antepartum ophthalmia is revived by Stephenson,⁸¹ who classifies all cases as such which develop within twenty-four hours after birth, a period too short for infection to have occurred during parturition. He believes the affection is far from uncommon, a contention borne out by his report of 17 new cases from his own and colleagues' observation. An instance of conjunctivitis following the instillation of a 4 per cent solution of euphthalmin is recorded by Kipp.⁸² The increasing frequency of injuries to the conjunctiva from the accidental introduction of aniline colors or substances containing aniline has led Vogt⁸³ to undertake a clinical and experimental research on the action of artificial aniline colors upon the conjunctiva. He concludes that (1) the acid, neutral, or mordant colors or those insoluble in water scarcely affect the conjunctiva. (2) Basic colors produce severe conjunctivitis which may terminate in panophthalmitis. (3) Experiments on rabbits show that the action of even the most caustic basic colors may be neutralized or destroyed by irrigation of the conjunctival sac with a 5 per cent solution of tannin. Water, sodium chloride, boric acid or sodium bicarbonate irrigation do more harm than good.

Cornea and Sclerotic.—In certain cases of buphthalmos, keratoconus intraocular tumors and progressive myopia—all conditions possessing in common the one feature of distension of the eyeball, clefts in Descement's membrane may be found (Stephenson⁸⁴). With the corneal microscope they appear as double contoured, greyish lines which resemble cracks in ice or flaws in glass. They lie at or near the posterior surface of the cornea. The possibility of severe parenchymatous keratitis occurring after a trifling injury is well known. Ohm⁸⁵ notes the development of bilateral parenchymatous keratitis in an inherited syphilitic following injury to one cornea. The same condition arose in other patients free from inherited taint. An unusual association of interstitial keratitis—turning white of the eyelashes—is described in Stephenson.⁸⁶ Certain of the rarer infectious diseases of the cornea are discussed by Zur Nedden:⁸⁷ (1) The infectious marginal ulcer. This begins 1—1.5 mm. from the corneal margin as a delicate infiltration. A crescentic ulcer then forms which enlarges from its ends and by confluence with other ulcers. The organism is the Zur Nedden bacillus. Contrary to the findings of other observers this author has not noted the Morax Axenfeld bacillus as a cause of marginal ulcers. Corneal ulcers due to the bacillus duplex (type liquefaciens of Petit) were found in 4 cases. He believes that the Petit and Morax-Axenfeld bacilli are related, but not identical. (3) A unique observation is the occurrence in one case of the influenza bacillus as the cause of a deep, round central ulcer. Inouye⁸⁸ records a case of keratitis due to ingestion of large doses of antipyrin. Under the title "keratitis ex acne rosacea" Schirmer⁸⁹ describes a superficial relapsing inflammation of

the cornea resembling scrofulous keratitis. It coincides with acne rosacea and recurs with exacerbations of the latter.

Cataract.—Is there a causative connection between goitre and cataract? To answer this question Ruch⁹⁰ examined the records of the eye clinic at Berne where goitre exists in from 54 per cent to 90 per cent of all inhabitants. The proportion of cataract was only 3.9 per cent, which is actually less than the proportion in Germany where goitre is rare. While cataract patients often have some signs characteristic of arteriosclerosis it is certainly not proved that senile arteriosclerosis is a cause of cataract. Meo⁹¹ found that out of 56 individuals with cataract, tension was above normal in 4 only. Practically the study of arterial tension is useful as showing the probability of post operative hemorrhage. Cataract following grave pernicious malaria is recorded by Cosmettatos,⁹² who ascribes the lenticular change to defective nutrition. A peculiar variety of partial stationary congenital cataract occurring in 20 persons in 4 generations of one family, is recorded by Nettelship and Ogilvie.⁹³ The lenticular anomaly consisted of a circular homogeneous thin layer situated between the nucleus and the posterior pole. Re-examination of certain of these cases after a lapse of several years showed that no change had taken place. The claims of Verdereau as to the efficacy of subconjunctival injections of potassium iodide as a cure for cataract (see Review of Ophthalmology for 1905) have not been verified by other observers. Menacho⁹⁴ in a critical review of Verdereau's work believes that the cures cited by the latter were simply instances of the well-known variability of the cataractous changes.

Choroid and Vitreous.—A patient of de Segalowitz⁹⁵ exhibited the following peculiar abnormality of the fundus: To the outer side of the macula and a little above lay a large mass of deep black pigment lying between two branches of the superior temporal vein. It lay beneath the retina. A short distance to the outer side of it there was a second sickle-shaped pigmented area with the concavity turned toward the first, and in the neighborhood were 24 other smaller masses placed underneath the retinal vessels. The spots were regarded as primary naevi of the choroid. Under the title "Excrescences of the ora serrata" Trantas⁹⁶ describes white or golden yellow threads projecting 2—5 mm. into the vitreous. They usually terminate in a globular swelling which reflects light more strongly than the thread. This appearance was visible in 26 out of 130 patients examined. In order to bring them into view, pressure must be made on the periphery of the fundus. At present 4 groups of amaurosis in infants are recognized: (1) Acute cerebral amaurosis of infancy (Gay). (2) Post convulsive amaurosis (Ashby and Stephenson). (3) Amaurotic family idiocy (Tay and Sachs). (4) Post meningitic amaurosis due to organic changes in the optic papilla. Stephenson⁹⁷ believes that a fifth group should be added to include a form of amblyopia consequent

upon inherited syphilis. He has frequently noted in infants undoubtedly syphilitic opacities in the vitreous, due remotely to a specific inflammation of the choroid or retina or both. Great improvement or cure took place under specific treatment. Paton and 'Paramore'⁹⁸ examined the blood by Dr. Wright's method in 3 cases of vitreous hemorrhage. They found that coagulation occurred faster than normal and that the proportion of calcium salts was higher than normal. These observations suggest that it is wrong to treat intravitreal hemorrhage with calcium salts and that the administration of drugs capable of reducing the calcium content, such as citric acid, would be more in accordance with the results obtained from analysis of the blood.

Retina.—The etiology of the formation of "holes" in the macula is the subject of an interesting paper by Ries.⁹⁹ He cites 4 cases of which 3 were traumatic. Although traumatism is the most frequent cause of this condition it is not the only one. Any condition accompanied by a severe edema of the retina may cause an atrophy of this, the thinnest and most vulnerable part. The prognosis and treatment of glioma of the retina is very carefully considered by Rochon Duvigneaud.¹⁰⁰ He dwells especially on the indications for exenteration of the orbit as against simple enucleation. He is convinced that "the great majority of gliomas, if taken to the operator early enough can be definitely cured by immediate and histologically complete intervention." If, after enucleation, it is found that the nerve has preserved its white colour and normal volume the prognosis is good and enucleation may suffice. If the nerve is small and atrophic, even though it appears free from tumor tissue, the orbit should be cleared out. Exenteration is demanded when the nerve is increased in size and lardaceous in appearance, or if it presents a grey core of infiltration. Two unusual cases of obstruction of the central artery with escape of the papillo-macular area are recorded by Grafenberg.¹⁰¹ In both cases what appeared to be a cilio-retinal vessel took part in the general shrinkage of the arteries. The area was probably partly supplied by small cilio-retinal twigs invisible to the ophthalmoscope. Its color became indistinguishable from that of the rest of the fundus but its function remained. Harbridge¹⁰² had the rare opportunity of observing, ophthalmoscopically, a spasm of the central retinal artery. The attack was ushered in by dilatation of the pupil, the inferior temporal artery gradually diminished in calibre (followed quickly by the inferior nasal and superior nasal) and then completely collapsed. Immediately thereafter the veins, beginning with the inferior temporal underwent a similar change. The disc became pale and a faint haze spread over the entire retina. The restoration of circulation was first noted in the arteries. During the attack, vision failed to complete blindness and did not return until after the restoration of the circulation. A somewhat similar case is described by Lundie.¹⁰³

Optic Nerve.—By means of Bjerrum's screen, Ramsay and Sutherland¹⁰⁴ have observed a vertical elongation of the blind spot in cases of congestion of the nerve head in eyes with signs of sympathetic irritation. After enucleation of the offending eye the blind spot resumed its normal size. The authors believe it highly probable that the spindle-like enlargement of the blind spot denotes active congestion of the optic disk, the shape being determined by increased size and turgescence in the superior and inferior branches of the retinal artery and vein, and further that the enlargement may furnish an important and valuable danger-signal of the approach of sympathetic inflammation. Hotz¹⁰⁵ describes a case of amaurosis caused by the ingestion of 130 grains of antipyrin in 48 hours. Central vision was completely abolished and the peripheral reduced to finger counting. Vision was finally completely restored under pilocarpin subcutaneously and iron. Under the title "Inflammatory affection of the ciliary ganglion associated with optic neuritis" Hay¹⁰⁶ describes a condition of which he can find no reference in the literature. In addition to the signs of retrobulbar neuritis, Hay's patient had a dilated and fixed pupil and partial corneal anesthesia. Inflammation of the ciliary ganglion is held responsible for the paralysis of the sphincter and the corneal anesthesia.

Muscles and Squint.—Rochon-Duvigneaud and Onfray¹⁰⁷ observed a case of bilateral chronic exophthalmus caused by tubercular sclerosis of the intraorbital muscles. The patient was a male of 62 with arteriosclerosis and mitral insufficiency. Increasing exophthalmus led to ulceration of the cornea. Death took place 20 months after the eyes became affected. On sectioning the orbital contents the muscles were found to be four times the normal size. In one rectus were found two typical miliary tubercles, one situated within the muscular fibres and the other within the aponeurosis. A sclerotic process affected the interstitial connective tissue. Tubercle bacilli could not be found. The authors believe that the case is absolutely unique. An investigation of the light sense in over 1,000 cases of convergent strabismus has convinced Mackay¹⁰⁸ that the condition of the light sense is not responsible for squint or amblyopia. Layton¹⁰⁹ reports a case of isolated influenzal neuritis of the abducens peripheral to the sphenoidal fissure. High hyperphoria resulting from a band of the left inferior rectus limiting the upward rotation of the globe is described by Colburn.¹¹⁰ After division of the muscle it was reattached to the globe and complete recovery followed.

Orbit and Globe.—Two observers—Meding¹¹¹ and Snow¹¹²—have commented upon the comparative frequency of retrobulbar hematoma in infantile scurvy. Recovery occurs under proper hygiene and diet. A very unusual case of traumatic enophthalmus is reported by Pasetti.¹¹³ When the patient bent forward the eyeball protruded, and compression of the jugular produced a similar effect.

Relations with Medicine.—Autointoxication in relation to ocular disease, a subject hitherto little considered, received attention from a number of workers, notably de Schweinitz¹¹⁴ and Elschnig.¹¹⁴ The type especially studied has been autointoxication of enterogenic origin. The most definite sign of gastrointestinal autointoxication is the presence of phenol and other ethereal sulphates in the urine. Practically the presence of indican in increased amount means decomposition of albumin in the digestive tract and may be taken as an indication of this type of autointoxication. Paralysis of the internal and external eye muscles, marginal corneal ulcers, relapsing scleritis and episcleritis, chronic iridocyclitis and recurrent iritis, iridocyclitis following operations, glaucoma, cataract and recurrent styles are some of the ocular conditions that may be dependent upon an enterogenous autointoxication. Antonelli,¹¹⁵ in discussing the so-called "rheumatic" affections of the eye, concludes that we should avoid the vague term "rheumatic" as applied to various ocular diseases and seek the true cause which will often be found in an autointoxication. Under the title: "What are the so-called reflexes than can properly be referred to eyestrain," Howe¹¹⁶ discusses the extravagant claims of certain ophthalmic visionairies that eyestrain can justly be considered a cause of a host of organic ocular and general disorders (including keratitis, iritis, glaucoma, cataract, sinus diseases, pharyngitis, influenza, tuberculosis, pneumonia, etc., etc.) and proves conclusively that these claims are not verified by the experience of American ophthalmic practitioners. A case reported by Bronner¹¹⁷ shows in a striking manner the necessity of caution in the interpretation of results after glasses have been put on. A young man suffering from headache, inability to use the eyes and loss of weight was given glasses by an optician for a supposed compound myopic astigmatism. Shortly after beginning to wear the glasses his headaches disappeared, he could again use his eyes with freedom and in a short time he had gained considerably in weight. Examination by Bronner showed that the patient's refraction was emmetropic. In other words, the wearing of wholly incorrect glasses had been followed by the disappearance of the patient's symptoms.

A clinical study of *Lepra Ophthalmia* is contributed by Grossman,¹¹⁸ whose observations were made at the Leper Hospital at Langarnes, Iceland. The progress of the disease was found to be more rapid and more pernicious in the nodular form both generally and as far as the eye was concerned. In *lepra tuberosa* the eyes were affected in all cases; in *lepra anesthetica* the eyes may remain unaffected if the nerves supplying the adnexa of the eyes remain free. Todd¹¹⁹ describes a case of complete resorption of pannus trachomatosis occurring in the course of typhoid fever. During the typhoid fever attack all local treatment was stopped. The pannus cleared completely in two weeks. It is thought that the typhoid toxin caused a diffuse endothelial proliferation and that these

cells then became actively phagocytic, taking up the red blood cells and lymphocytes, and may have been capable of removing foreign tissue from the cornea. A new eye symptom in Graves' disease is described by Gifford,¹²⁰ namely, a marked involuntary resistance to eversion of the upper lid. It is an early sign and bears no realization to the amount of exophthalmus and tends to disappear with the development of the disease. It is assumed to be due to the hyperexcitability of Mueller's muscle through sympathetic irritation.

Eye and Nose.—Gibson¹²¹ emphasizes the important role of nasal obstruction as a cause of "pseudo-myopia." He has repeatedly observed that, following removal of adenoids, young hyperopes can relinquish their glasses, are in fact more comfortable without them. He believes that the excessive accommodation comes as the result of constant excess effort required in breathing through an obstructed nose—of the nature, in fact, of an overflow stimulus from the respiratory centre. An unusual case is recorded by N. M. Black¹²² in which frontal sinusitis gave rise to retrobulbar neuritis.

New Books.—Among the books of the year are the following: "Elementary Handbook on the Practice of Sight Testing and the Choice of Spectacles," by Scrini and Fortin; "Dictionary of Ophthalmic Terms," by Gros; "A Manual of Diseases of the Eye," by May and Worth; "The Ophthalmoscope and How to Use It," by Jas. Thorington; "The Eye and the Nervous System," edited by Posey and Spiller; "The Employment of Alkaloids in Oily Solution," by Scrini; "Eye Remedies," by H. Snel len, Jr.; "Photocopy," by M. D. Stevenson; "The Ophthalmic Year Book for 1905," by De Schweinitz and Jackson; "Squint, Etiology, Consequences and Treatment," by Schoen; "Guide to the Examination of the Eyes in General Disease," by Heine.

Deaths.—Death has been busy in the ranks of eminent ophthalmologists in the past year. A partial list includes Burnett, De Wecker, Hosch, Sachs alber, Rogman, Roche, Murdoch, Gelpke, Spencer Watson, Rymowicz, Czermak and last but not least, Hermann Cohn.

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ORTHOPEDIC SURGERY.

IN CHARGE OFNATHANIEL ALLISON, M. D.

Diseases of the Joints.—Since the beginning made by Brodie in 1818 to classify and describe the class of cases afflicted with joint-disease, many observers have taken a hand towards simplifying our understanding of these conditions. It is only within the last few years that any definite results have been realized in establishing a modern pathology and clinical classification for these affections. The confusion of terms resulting from this work has done much to mystify the casual observer. Within the last year, several attempts have been made to clear up this chaos, and to place our knowledge in some rational form, that it may be understood and easily grasped by all. Marsh¹ has pointed out the necessity of not mistaking symptoms for diseases and effects for causes. He dwells upon the importance played by infection in the production of many of these joint lesions. Following up the illustration furnished by the pneumococcus, an organism first discovered in the lung in cases of lobar-pneumonia, but met with in the joints as a definite cause of arthritis, he is inclined to classify the various examples of infectious arthritis under three heads; the first of which has been long familiar as an arthritis following direct infection of a joint by a wound, or occurring in the progress of an acute infective osteomyelitis or pyemia. The second class follows specific fevers, such as acute rheumatism, scarlet-fever, typhoid, influenza, or dysentery. This class is readily grasped, and its association with the acute disease is usually at once obvious. The third group is one of great clinical significance, in that it includes cases which are apt to lead to serious oversight or mistakes. The infection here is produced by such every-day agents as the streptococcus, the staphylococcus and the gonococcus; but the symptoms and occurrence of joint involvement are of such a character, and take place at such a time that the association with the original infection is apt to be undetected. This he regards as being particularly the case where the gonococcus is the agent, and he shows in illustration of this point that the arthritis developed may be of two varieties, one occurring in the acute attack of the disease, and evidenced by rapid effusion, surface heat, severe pain and general illness; the other where the virulence of the organism is dwindling towards extinction, and is probably growing in company with some other bacterial element, producing a grade of arthritis of distinctly sub-acute variety, evidenced by slowly increasing swelling, slight pain unless the joint is

actively used, marked stiffness, and the muscular wasting which invariably accompanies chronic arthritis. This variety presents a picture clinically closely resembling that seen in tuberculous diseases. Aside from the gonococcus, the form of septic arthritis resulting from the invasion of the staphylococcus may be derived from many sources. A septic process existing in any organ or part of the body may give rise to this form of joint affection. The part played by the tonsils, by necrosed teeth, or by chronic bronchiectasis has been sufficiently demonstrated. He calls attention to the danger of overlooking these primary seats of infection, and attributing the joint condition to a mild form of rheumatism. Nathan² has grouped this class of cases under the term "infectious polyarthritis," and has pointed out that at times the general symptoms of the infection may be so mild that they are probably overlooked altogether, but that in others there is severe toxemia, or bacteraemia, evidenced by marked constitutional reaction. The course after the initial acute joint symptom appears, depends upon the damage done to the affected joint, and upon the continued presence of the invading organism. Where no definite infection as a primary cause can be made out, he is inclined to the belief that there are two forms of metabolic joint-disease, which would fall clinically under what has been frequently described as rheumatoid arthritis, an arteriosclerotic form, and an autotoxic form. These two classes are represented by no distinct clinical or pathological condition, and are not due to bacterial invasion of the joint. He does not associate the affection thus classified in any way with rheumatism, but believes that one class is due to metabolic conditions, and that the other results from arterial changes of a senile character, both resulting in stiffening and deformity of the joints. Schueller³ has again stated his opinion that the disease called polyarthritis chronica villosa is caused by a dumb-bell shaped bacillus. His opinion has not been verified by any other observers. McCrae,⁴ taking typhoid-fever as an example, and pointing out that the typhoid bacillus, or the paratyphoid bacillus, may cause spondylitis, with or without changes in the vertebrae, suggests a list of infectious diseases which have been reported as causing definite joint lesions. This list includes scarlet-fever, measles, influenza, septicemia, pyemia, phlegmon, pneumonia, pustular acne, purpura and scurvy. He also suggests the thought that some of the reports of joint conditions following acute rheumatism may have been instances of acute arthritis wrongly diagnosed. He points out that the spondylitis resulting from typhoid-fever suggests that arthritis deformans may be due to various infective agents. Elliott⁵ has simplified the classification of the chronic arthritides of the spine by dividing them into two main groups. The first of these he calls *ostitis deformans*, and characterizes

it as follows: "A painless, deforming, passive, osteophitic, new bone formation, secondarily produced and degenerative in character." This class of disease occurs in those of advanced age, who have led lives of exposure, and done work subjecting the individual to constant traumatism. It is associated with arterial sclerosis, and does not cause symptoms. There is exostosis and bridge formation, with loss of intervertebral substance. The second class he designates "chronic ankylotic inflammation of the spine," which presents an active symptom complex, affecting subjects in young adult life, characterized by increasing vertebral rigidity, with or without root symptoms, and often with involvement of large and small joints of the extremities, tending towards complete bony ankylosis of the vertebral column. Under these two heads, after a complete review of the literature, and the tabulation of 51 cases, he is of the opinion that all the cases of true spine rigidity may be grouped. The Bectereu type, the spondylose rhizomelique of Strumpell-Marie, he believes to be simply variations in degree of chronic ankylotic inflammation of the spine. Traumatic spinal rigidity, as well as muscular spinal rigidity, may be easily differentiated from the cases where there is definite bone change, by the use of an anesthetic. Marie,⁶ in a description of the condition described by him as spondylose rhizomelique, states that it is undoubtedly a condition of infectious origin, or of toxemia due to infection, resulting in its tendency to ligamentous ossification and complete ankylosis of the spine, with involvement usually of one or more of the larger joints. His work is based upon several carefully observed autopsies.

From these observations, it is possible to make the following conclusions: That all joint diseases can be naturally divided into two grand classes:

- (1) Where the process primarily begins in the intra-articular membranes;
- (2) Where the bone is primarily involved.

We may conclude that very many of the cases formerly described under the head of rheumatoid arthritis are of infectious origin, and are due to the invasion of the joint by some definite bacterial agent brought thither by the circulation, or lymphatics, from a primary focus situate elsewhere in the body. We may conclude also that there is still a class of chronic arthritides presenting variable clinical pictures, which are the result of metabolic or arteriosclerotic changes in the individual.

The work that has been accomplished in the last year in this field of endeavor is of the most encouraging sort, in that the tendency, so long evidenced, of establishing new disease entities, has given way to an almost universal desire to collect under as few heads as

possible the differing clinical descriptions, and to assign to each a definite pathology.

Intermittent Limping.—Lovett⁷ has described three cases of this affection, which is a rare condition in America, but of more frequent occurrence in Russia, Poland and the Baltic Provinces. He calls it to the attention of orthopedic surgeons, in order that they may have the opportunity of recognizing the condition in its incipiency. Charcot first described this condition in 1858. The condition is characterized by a striking symptom complex. There is pain and cramp in the calf of the leg in walking. There is obstruction to the arterial circulation, shown by pallor and coldness of the foot. There is absence of pulse in the dorsalis pedis and posterior tibial arteries; pain on letting the foot hang down, when the blood enters the arteries; a feeling of coldness of the foot during the night; severe spontaneous pain during the night; a tender induration in the calf of the leg, and the existence of static trouble in the foot. The pathology of this affection is in most cases an obliterating arteritis. Jews are susceptible more than any other race to this affection. Of 65 cases reported, 62 occurred in Jews. In one of Lovett's cases, gangrene resulted demanding an amputation at the lower third of the thigh. The pathologist's report was that there was a diffuse, obliterating endarteritis. His second case was put to bed and kept exceedingly quiet, with the foot elevated, for three weeks. This was followed by the use of crutches and gentle massage, and resulted in the disappearance of active symptoms. The third case has improved after long rest, but the circulation has never quite returned to the normal. Irish⁸ has also reported a case of intermittent claudication, and has given a review of the literature on the subject. His case he states was due to angio-sclerosis of the extremities, which only improved slightly after a long period of rest and treatment.

Congenital Dislocation of the Hip.—Bradford⁹ states that at the present stage of development of the treatment of this deformity, there can be no question that the operation of choice is that of reduction by operative manipulation. It is not only the simplest and safest method, but in a considerable number of cases is the most satisfactory, in that results can be obtained without the employment of any other means. In a considerable percentage of cases, however, complete ultimate success is not obtained by manipulation. Either the anatomical conditions are inadequate to retention of the head in the acetabulum, after manipulation, or the infolded capsule prevents such retention. Permanent reduction of congenital hip dislocation consists not only in placing the head of the femur well within the acetabulum, but in putting the head of the femur in such a relation to the cartilaginous and ligamentous lips of the acetabulum, that the femoral head will re-

main in place. For this class of cases, i. e., those that do not stay reduced after several attempts at manipulative replacement, Bradford recommends an operation for reduction by incision. The older method of gouging or curetting the acetabulum to make it deep enough to retain the reduced head, he does not deem advisable, but suggests in its stead the utilization of the capsular folds for such retention. The operation described by him has been performed on 16 cases, 13 single operations and three double operations, making 19 operations in all. Of these, 14 were successful, four relapsed, and one resulted in death. The steps of the operation are as follows: The patient is placed on the side, and incision is made, passing from the anterior superior spine obliquely backwards and downwards. By blunt dissection, the femoral head is cleared. It is then brought as far forward as possible, and a cross incision is made in the capsule where it is jointed to the head. The attachment of the capsule to the lesser trochanter and to the femoral neck is also severed. The capsular lumen is then inspected and explored with the finger, to determine whether it is sufficiently large to allow the passage of the head. If it is found constricted, it should be dilated by incision. The capsule should then be well retracted, and the head passed to the bottom of the acetabulum. The capsule should then be stitched about the head with silk or some slowly absorbable suture material, in such a way that it will develop a retaining ring around the neck of the femur. The wound should then be closed, and the limb placed in a fixation bandage, in abduction of about 45 degrees. Kirmisson¹⁰ has made a complete review of the literature of the last five years on congenital dislocation of the hip. He concludes that the bloodless reduction of these luxations under an anesthetic very rarely furnishes perfect results, anatomically speaking, but from the point of view of function, the results obtained are excellent. He states that the most favorable age to accomplish reduction is between the age of three and five years, and that where the individual is of such an age as to render radical cure impossible, subtrochanteric osteotomy affords a result which very often alleviates the severe limping.

Nove-Josserand and Petitjean¹¹ state that a consideration of the statistics has convinced them that the most advantageous time for manipulative reduction is before the fifth year, and that the most favorable prognosis can be given when the case is between the second and third year. After the seventh year, the treatment may be successful, but after the tenth or eleventh year, a relapse is probable. They also conclude that there is no advantage in lessening the time of immobilization in the plaster-cast, but hold, on the contrary, that a shortening of this period would favor a relapse. Authorities throughout the world have come to the common conclusion that the manip-

ulative reduction method, advocated by Lorenz, is in the majority of cases, sufficient to accomplish a cure of this deformity.

Coxa Vara and Fractures of the Femoral Neck.—Coxa vara, or the deformity of the upper end of the femur, in which the normal angle formed by the neck and the shaft of the bone is lessened, has been thoroughly considered during the past year by several observers. Helbing¹² has divided it into two main classes; first, where it is congenital, and second, where it is the result of disease or injury following birth. Where the condition is congenital, he states that it may exist as a deformity due to unknown origin, or due to a defect in foetal development associated with other deformities of this nature. Coxa vara that appears after birth may be due to rickets, osteomalacia, osteitis fibrosa, osteomyelitis, tuberculosis, cyst formation in the bone, arthritis deformans or traumatism. Of 10,000 cases that appeared at the Berlin University Clinic, with orthopedic conditions, 77 presented coxa vara. Of these, 20 were of congenital origin, 9 single, 8 double, and 3 in cases of congenital dislocation of the hip. Thirteen were in girls and 7 were in boys. Of the cases not of congenital origin, 24 presented rhachitic deformities, 6 were cases of coxa vara adolescentium, 2 were cases where cyst formation had taken place in the upper end of the femur, 4 were due to tuberculosis of the bone, and 20 were due to traumatism. His article contains a complete bibliography of the literature, and thoroughly considers the various methods of treatment. Schwartz and Siegel,¹³ in a contribution to the study of traumatic coxa vara, divide the cases into two principal categories, the first where there is separation of the epiphysis of the head, or fracture of recent date, and the second where the traumatism is old and the coxa vara is established. For the first class, they recommend the immediate placing of the limb in abduction, after the manner of Hennequin, until union has taken place. For the second class, they recommend one of the various forms of osteotomy, at or near the trochanter major, with correction of the angle to the normal. They insist upon the value of frequent radiographs as a check on the treatment. Feiss¹⁴ has reported a case of congenital coxa vara, which was noticed at the time of birth, the physician observing that the limbs were in a peculiar position, the right one flexed with the knee pointing outward in the normal way, but the left with thigh adducted and presenting extreme flexibility at the hip-joint, suggesting congenital dislocation. There is little doubt that this case was of intra-uterine origin. The author concludes that congenital coxa vara is usually associated with defects or deformities of other parts, and that the cases are often associated with an adducted position of the thigh in utero.

Fracture of the Femoral Neck.—Closely associated with the treat-

ment of coxa vara, the treatment of recent fracture of the femoral neck has been carefully developed by Whitman¹⁶. The well-established belief that this particular fracture differs from all others in that the quality of the patient, or the character of the injury, renders treatment of little avail, he severely criticises, stating that the teaching which has been long in vogue is responsible for the present neglect of this most important and most disabling of all fractures. The condition is not an attribute of old age, as it has been frequently observed in adolescence, and is responsible for a large proportion of the cases of unilateral coxa vara. It is a well recognized fact that the older methods of treatment, i. e., extension by weight and pulley, and fixation by the long splints, have been uniformly unsuccessful. After carefully considering the mechanics of this fracture, the author concludes that there are particular advantages in the following conditions: Complete abduction of the extended limb firmly opposes the trochanter to the side of the pelvis, so that upward displacement of the femur is impossible. This attitude brings the capsule tense and serves to direct the fragments towards one another. It removes the influence of muscular contraction, which tends toward deformity, in that the abductor group is relaxed, while the contraction of the iliopsoas muscle tends to draw the fragments towards one another. He advises, therefore, that the limb be abducted and placed in a plaster of paris dressing, in this position, for all fractures at or about the femoral neck, and that the patient be confined for a sufficient period to assure union. Allis¹⁹ states that theoretically the position recommended by Lorenz in the treatment of congenital dislocation of the hip would give the best results in fracture of the femoral neck. This, however, he believes would be intolerable in practice. It indicates, nevertheless, that abduction of the thigh will give better results than the extension generally practiced by means of adhesive plaster, pulley and weights. Taylor¹⁷ states that immobilization of the joint should be kept up for at least eight weeks, and that no weight should be permitted upon the limb under twelve weeks. He states that the results following treatment by operation are very encouraging, and that operative treatment should always be undertaken in badly neglected cases. Soutter¹⁸ has pointed out the advantages gained by subtrochanteric osteotomy and abduction of the limbs, for the class of cases that presents adduction deformity and shortening after hip-disease, a condition of practical significance in the consideration of coxa vara. He reports 25 cases, on which this operation produced brilliant results. The cases averaged fourteen years of disability. They were inactive and unable to walk or stand, and were changed into individuals able to be aggressively active and self-supporting. Not only was the local condition bettered, but the general health was

greatly improved. Walking became possible in from five weeks to ten months, and became easy at nine, eleven, fifteen and eighteen months, an average of ten months after operation. Standing became easy in from three to nine months after operation. Two of these cases had a few degrees of motion, the others no motion whatever. Shortening in all but two cases was noticed from the time of the disease, and varied from two and three-quarters to seven and three-quarters inches, an average of four inches. The operations were performed from ten to thirty-five years after the original trouble began, and consisted of linear osteotomy just below the trochanter major, thorough stretching of the short muscles, and abduction to nearly 45 degrees, without flexion or outward rotation, and the application of a plaster of paris spica bandage. The recumbent position was maintained for six weeks; apparatus was worn for six months after operation. This resulted in no relative shortening in 23 cases; in 2 cases, one of which before operation presented 6 inches shortening, and the other $7\frac{3}{4}$ inches, of a reduction to $1\frac{1}{2}$ inches shortening. A position of 20 to 25 degrees of abduction was maintained. All legs increased in size after operation, especially the calf.

Bradford,¹⁹ in an article on the use of traction in hip disease, has presented the following argument in its favor: The use of a force that will counteract muscular spasm, and draw the head of the femur away from the acetabulum, favors correction, prevents deformity, and aids healing of the diseased bone tissue. Experiments and skiagraphic evidence show that a traction force can be applied, which will not only entirely overcome the spasm of the muscles about the hip, but which will also, unless ankylosis has been established, draw the head of the femur away from the acetabulum. Clinical experience has shown the advantage of a traction force in the treatment of hip-disease, which is needed only during the stage of active muscular spasm. Traction joined with fixation is needed in the ulcerative stage of the disease. These conclusions are based on the observation of 3,400 cases of hip-disease treated during the last thirty years at the Boston Children's Hospital.

Lateral Curvature of the Spine.—Lovett,²⁰ whose observations on this subject are in all probability the most accurate and conclusive yet made, has written a paper on the treatment of the condition, in which he emphasizes the prevalence of lateral curvature, stating that it occurs in at least 25 per cent of all children, making a problem worthy of serious consideration. He divides the cases into two distance types: (1) The *postural or functional*, and, (2) the *structural or organic*. Postural scoliosis may be described as "faulty attitude," and may persist unchanged as a total scoliosis, with its convexity to the left, with an elevation of the left shoulder, and a depression of the

right; a twisting of the shoulder-girdle, the right side being carried back, and the left projected forward. This condition is within the physiological limit of normal spinal movement, and can be produced in a normal subject by raising the foot with a book. The structural or organic type shows definite organic change in the vertebral column and its attached structures. Three forms are met with: Single and total; compound, consisting of two approximately equal opposite curves; and compound, showing three curves, one large and central, and two smaller. Postural scoliosis is treated by supplying a correct for a faulty attitude. Gymnastics and general hygiene should be instituted. Visual defects, inequalities in the length of limb, and other irregularities should be corrected. Structural scoliosis is treated by means directed towards loosening the stiffened parts of the spine so as to render an improved position possible. This is done by gymnastics, passive stretching, and stretching by forcible correction in plaster jacket. This should be accompanied by treatment designed to retain the improved position, such as a self-correction, gymnastics, symmetrical heavy gymnastics, and retention by apparatus. Wilson²¹ has called attention to certain forms of spinal distortion depending on postures of the head, citing several cases seen with Gould, which presented ocular defects resulting in head-tilting and consequent postural scoliosis. Böhm,²² in an excellent paper, has pointed out the important part played by the peculiar developmental error which leads to numerical variation of the spine in the causation of habitual lateral curvature. He presents 20 cases of lateral curvature, in which definite numerical variation in the number of vertebrae was made out at the primary seat of deformity by skiagrams. He concludes that the developmental error of the human body occurring in embryonic life, which has its morphological expression in so-called numerical variation of the spine, causes in certain instances lateral deformities of the spine, which manifest themselves in the first half of the second decade of life, and which hitherto have been considered as affections acquired in post-natal life, owing to purely functional conditions.

Hallux Valgus.—Wilson²³ has made an analysis of 152 cases of hallux valgus in 77 patients, and has reported upon an operation for its relief. As etiological factors in this condition, he states that any long continued maintenance of position of the big toe, that prevents normal function and posture, will produce hallux valgus. Consequently this condition prevails among shoe-wearers, especially those who wear shoes that are too short and those having high heels or pointed toes, but the greatest factor of all in its causation is the everted and pronated position of the foot in standing and walking. Of the 152 feet examined, 14 were in patients between 20 and 30 years of age; 23 between 30 and 40; 24 between 40 and 50, and 8 be-

tween 50 and 56 years. Exostoses were found in 141 of the cases. Pronation existed in 121 of the feet; 132 feet were markedly everted while walking. In 16 cases there was overlapping by the big toe, and in 124 there was overlapping by the smaller toes. The operation recommended by Wilson, in certain suitable case, i. e., those where there is either real or apparent exostosis formation, associated with more or less extensive dislocation of the phalanx, and the presence of an inflamed bursa, consists in cutting off the inner aspect of the metatarsal bone, with a pair of bone-pliers, and smoothing the edges with a chisel. In three weeks patients operated upon in this way walked with normal function, freedom from pain, and with the big toe in a position closely approaching the normal standard. He states that the inclination on the part of the patient to object to a proper straight position of the great toe, because of the difficulty of wearing what he or she considers "shapely" or "stylish" shoes, is a tendency toward the return of hallux valgus.

The Plaster of Paris Bandage.—Meisenbach²⁴ has made a valuable contribution, the object of which is to give the results of practical experiments made with the plaster of paris bandage, to determine the influence exerted by substances which shorten or lengthen its setting time, and which weaken or strengthen the texture of the resulting dressing, his object being to determine the question, whether we can modify the plaster of paris dressing, so that it will be stronger, lighter and at the time set quickly. A series of experiments were carried out to determine the time of set, the crushing force, the tensile strength and the porosity of the various combinations of gauze and plaster of paris used to make the ordinary plaster of paris bandage. He concludes that the essential things of value for a good plaster dressing are strength, light weight, quick set and ventilation. The addition of chloride of sodium in small amounts to the water used to soak the bandage, hastens the set but weakens the dressing in crushing force and tensile strength. Dextrine in small amounts strengthens the dressing, but it lengthens the time of set. Starch in small amounts adds to the strength by increasing the tensile strength. Portland cement, added in the proportion of one to nineteen to the plaster of paris when the bandage is rolled, materially strengthens it in all its essentials, and at the same time reduces the time of set and the density. The best material for the plaster bandage is the starch-sized crinoline.

The Surgery of the Paralyzes.—Townsend²⁵ has made a report on the value of the operative procedure for the relief of disability following poliomyelitis anterior. His report covers the operative work done for the relief of paralytic club-foot at the Hospital for Ruptured and Crippled in New York City. He divides the work into three stages: 1894-1899, arthrodesis; 1899-1901, tendon-transplantation; 1901-1905,

arthrodesis, tendon-transplantation, or the two combined. He states that the best results following arthrodesis have been achieved in children operated upon after the sixth year, and that the later in life the operation is performed, the more likely is the arthrodesis to be firm and lasting. After arthrodesis at the ankle, the limb should be supported for a much longer time than is usually advised, if the best results are to be obtained. The plaster-cast should be kept on at least three months, and should be followed by suitable apparatus. Arthrodesis should be performed in cases where no power exists in the muscles about the joints, or where the power is slight. Many cases that have been subjected to tendon-transplantation would have derived more benefit from an arthrodesis. The operation should not be performed on the very young, for the obvious reason that the growth of bone might be inhibited. For hospital cases, he believes the employment of arthrodesis is followed by the best results. Redard²⁶ states that arthrodesis must be recognized as an operation that provides a most fortunate result where there is loss of power about a joint, or where there is tendency toward a faulty position. Tubby²⁷, in the Hunterian Oration for 1906, states that arthrodesis finds its place in the treatment of infantile paralysis when a joint is hopelessly flail-like. In the foot, stability is the first essential. Arthrodesis is not so suitable for the knee as for the ankle. Where the patient can be kept under constant observation, tendon-transplantation, if there is power, will perhaps result in a more mobile and useful part than can be secured by arthrodesis; but where ideal conditions of observation are not possible, he believes arthrodesis will give the best results. As to the cause of want of success following tendon-transplantation, he cites these factors: Deficiencies in technique, defects in perfect asepsis, cicatrization at the point of the tendon slip, subsequent yielding of the tendon of the paralyzed muscle, and the employment of too much or too little tension on the transplanted tendon. In estimating the success of these operations, it is necessary to consider how far an apparently paralyzed muscle is capable of recovery, if aided by removing the harmful effects of constant stretching, and by reinforcing its tendon. In attacking the paralytic affections, either by tendon-grafting, muscle-transplantation or nerve-anastomosis, we are confronted by a most intricate problem, but the early results, considering the comparative failure of all preceding measures, seem to justify a very careful and well considered trial in suitable cases. Bradford²⁸ says that the collection of statistics as to the value of tendon and muscle-transference is extremely difficult, for the reason that each case is a case of itself, presenting certain difficulties which may not exist in other apparently similar cases. At the Boston Children's Hospital, the operation of tendon-grafting, or muscle-transference, has been performed in upwards of 300 cases in the last twenty years. In 48 cases collected in March, 1906, 33 were found to be much improved by operation, 14 showed no improvement, and had died of an independent condition. There are few procedures in the whole range of surgery which are more satisfactory in their results. The essential consideration is that the surgeon's judgment

should be based on a considerable experience in planning and selecting the procedure suited to each case. Spiller and Frazier²⁹ have reported several successful cases where transplantation of nerves in cases of acute anterior poliomyelitis has resulted so successfully that this procedure may now be regarded as passing beyond the experimental stage. They have devised a method for the treatment of athetosis, consisting of switching off, so to speak, some of the excessive innervation of the flexor group of muscles into the extensors by nerve-transplantation, and thus establishing a more nearly normal relation between certain groups of muscles and their opponents. Butler³⁰ suggests a classification for the cerebral palsies of children. The paucity of pathological information has developed considerable conjecture, and as a result various views have been advanced in the explanation of these paralyzes. The author gives the following explanation of the cause of spastic hemiplegia. First, vascular lesions, such as hemorrhage from venous or arterial ruptures, the result of trauma, or occurring spontaneously in intense congestion, as in convulsion, or the paroxysms of whooping-cough. Embolism from cardiac or arterial thrombosis, or endocarditis, may also be a cause. Second, inflammatory changes, such as acute encephalitis and meningo-encephalitis, and third, which is rare, a tumor.

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